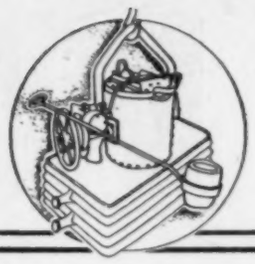

The Foundry

VOLUME 65 • NUMBER 12

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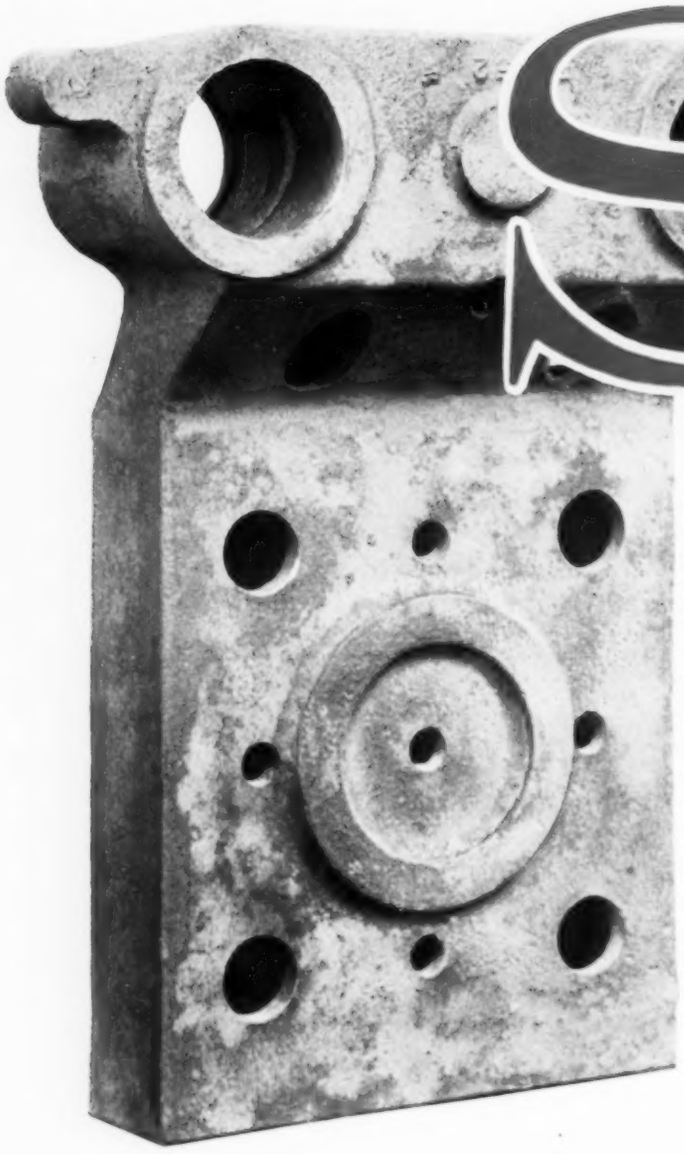

STE

Prefers

LI

The choice in

2250-pound casting for The Adamson Machine Co. (Akron, Ohio) hydraulic press, made with Linoil by

The Crawford Steel Foundry Company

BUCYRUS, OHIO

Their castings range from a few pounds up to nine tons.

THE WERNER G.

(DIVISION OF ARCHER-

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Service and

New York, N. Y.	Chicago, Ill.	Boston, Mass.	St. Louis, Mo.
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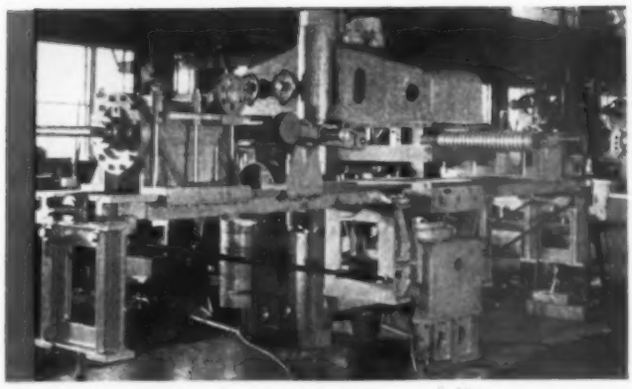

This is the assembled press in which casting on left is used.

NOIL

nine out of ten Steel Foundries

Gentlemen: Bucyrus, Ohio, November 20, 1937

My associates and I have used Linoil in various foundries for twenty years and are thoroughly conversant with its good qualities. Naturally when this foundry was opened we adopted Linoil as our standard oil binder.

We are firm believers in Linoil cores for steel work. With it it is possible to make cores of sufficient strength to withstand the heat of steel and the weight of heavy sections. We get no core blows and no scabbing.

Last, but not least, we clean the burned cores from the castings at a minimum cost. We use Linoil because it is satisfactory and economical.

THE CRAWFORD STEEL FOUNDRY COMPANY

Frank D. Glosser, Vice Pres. & Gen'l. Mgr.

SMITH COMPANY

DANIELS-MIDLAND COMPANY)

4690 **Cleveland, Ohio**

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BARRELS

Pangborn Airless ROTOBLAST "Rocker" Cleaning Barrels . . . for economical general Foundry Blast Cleaning. Produces work with gleaming, uniform finish, ideal for all further processing. Pangborn Airless ROTOBLAST Tables, one of which is pictured on opposite page, are economical cleaners for flat and fragile work . . . for elimination of warpage and reduction of cleaning costs.

WORTH WRITING ABOUT TODAY, ISN'T IT?

PANG

TABLES

START 1938 RIGHT!

Lower your blast cleaning costs ... steer clear of all "headaches" ... build up increased production ... easily ... quickly with Pangborn ROTOBLAST Barrels and Tables ... the outstanding airless units of 1937.

The year's list of users grew with wild-fire speed and the "who's who" includes Chevrolet, Ford, Oliver Farm, Deere, Frigidaire, American Laundry, Michigan Malleable, Florence-Wehrle Stove, and many others too numerous to mention here.

Pangborn engineers, backed by 33 years experience in building and servicing all types of Blast Cleaning equipment, are trained to think of the job from *your* side of the desk.

ROTOBLAST

FOR LOWER BLAST CLEANING COSTS IN 1938

PANGBORN CORPORATION • HAGERSTOWN, MARYLAND

"The World's Largest Manufacturer of Blast Cleaning and Dust Control Equipment"

BORN

Stoney Knockout Machines

Medium Size Machines removing cores from a Transmission Case in a large tractor plant in 10 seconds.

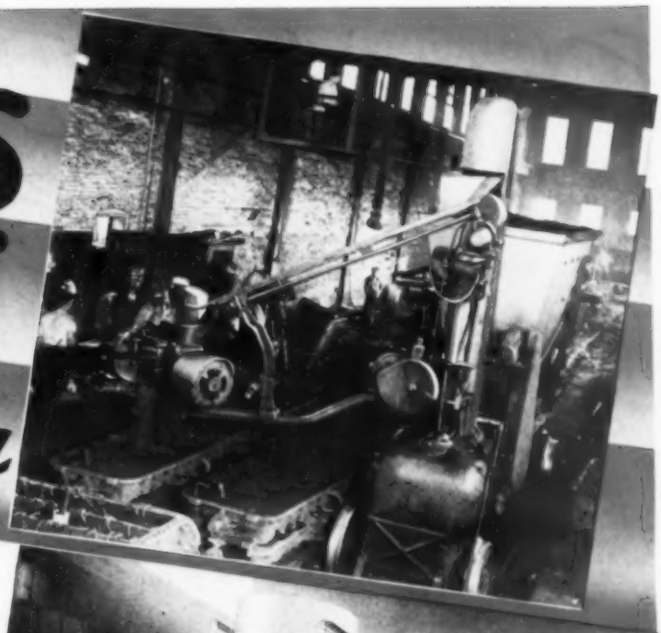
Built In Sizes And Types To Suit
All Requirements

The Stoney

Foundry Engineering & Equipment Co.

5321 St. Clair Avenue **Cleveland, Ohio**

16 YEARS OF SERVICE *And Still Going Strong!*



Above, the first Motive Type *Sandslinger* built 16 years ago. Still in daily use at the American Manganese Steel Company, Chicago Heights, Illinois.
Below, a modern Motive Junior *Sandslinger* with Facing Feeder at the Zenith Foundry Company, West Allis, Wisc.

The first Motive Type *Sandslinger* built was sold to the American Manganese Steel Company for use in their Chicago Heights Foundry. That was 16 years ago, and it is *still in regular service!*

While it lacks many of the improvements and refinements of the modern Motive Type *Sandslinger*, it has nevertheless been a paying proposition from the first day of its installation and every day of the 16 years that it has been in use!

Used on medium to large sized molds, this "first" *Sandslinger* effects savings of over 25%, and even greater savings were realized during its first years of use when it was operated two shifts per day.

The American Manganese Steel Company has purchased six *Sandslingers* since the "first" for their Chicago Heights, Denver and St. Louis foundries, but the original Motive Type Unit goes on about its business daily reducing molding costs and making better castings with less labor, in less time!

Beardsley & Piper have come a long way since the first Motive Type *Sandslinger* was built; many design changes and improvements have been made; but then and now, it has always been the best equipment available for jobbing work — lowering costs, saving labor, and improving casting quality! Over 700 *Sandslingers* are now in use—several hundred Motive and Motive Junior Type Units—ramming all types and sizes of molds in both dry and green sand in gray iron, steel, malleable and non-ferrous foundries. Savings of over 60% accrue to the use of *Sandslingers:* savings in labor — savings in floor space—reductions in accessory equipment — reductions in discount and scrap losses — reductions in weight — plus greater pattern accuracy for every casting, and proper sand density control.

You, too, can enjoy the savings that other foundries are realizing from the use of *Sandslingers.* You can buy them on the Rental Purchase Plan—paying for them out of what they save for you. A thorough knowledge of what *Sandslingers* are saving for other foundries prompts us to again make this offer — buy *Sandslingers* on the Rental Purchase Plan!

Increase Profits with

THE BEARDSLEY & PIPER CO.

2541 N. KEELER AVENUE, CHICAGO, ILLINOIS

SANDSLINGERS, SPEEDMULLORS, SAND HANDLING, PREPARING, AND MOLDING EQUIPMENT

REPRESENTATIVES IN PRINCIPAL FOREIGN COUNTRIES

The Night Before Christmas in the Foundry

'Twas the night before Christmas when all through the shop
Not a creature was stirring, not even a cop,
When an old grain of sand awoke with a start
And blurted this out from the depths of his heart:
"I'm burdened with sorrow, I haven't done right;
My face is all blackened, I'm burned and a sight!
That smooth coat of clay I had at the pit
Is burned on a casting and now I'm not fit.
One day I'm too wet and the next day too dry—
If there's a Santa Claus, please hear my cry!
Our boss is no Scrooge, and if he but knew,
He'd buy us sand grains a SIMPSON or two,
To coat us with bond and temper us right
And improve the condition that we're in tonight.
We then could make castings more perfect and clean,
And the boss sure would gain from a SIMPSON machine."

The boss rolled and tossed as he lay in his bed,
As this dream of his foundry whirled through his head.
He knew competition next year would be keen;
To reduce sand and labor, he also must scheme.
He thought of his dream and decided right quick
A new SIMPSON MIXER would sure do the trick.
He thought of the waste sand that he could reclaim
By the use of clay bond that had sprung into fame.
So he wired his order—don't you think he did right?
A Merry Xmas to all, and to all a Good-night!

—C. D. Hollins—

NATIONAL ENGINEERING COMPANY
MACHINERY HALL BUILDING 549 W. WASHINGTON BLVD.
CHICAGO, ILL., U. S. A.

MANUFACTURERS AND SELLING AGENTS FOR CONTINENTAL EUROPEAN COUNTRIES—THE GEORGE FISCHER STEEL & IRON WORKS, SCHAFFHAUSEN, SWITZERLAND
FOR THE BRITISH POSSESSIONS, EXCLUDING CANADA AND AUSTRALIA—AUGUST'S LIMITED, HALIFAX, ENGLAND
FOR CANADA—DOMINION ENGINEERING CO., LTD., MONTREAL, CANADA.

High-Nitrogen Ferrochrome

improves High-Chromium Steel Castings

HIGH-NITROGEN ferrochrome adds both nitrogen and chromium to steel. A small amount of nitrogen in cast steels which contain over 20 per cent chromium greatly refines grain size, reduces objectionable grain growth at high temperatures, materially improves strength and toughness without sacrificing ductility and effects a slight increase in hardness.

For example, a 25 per cent chromium-10 per cent nickel alloy steel, treated with nitrogen, showed a tensile strength of 22,500 pounds per square inch and an elongation of over 10 per cent in 2 inches at 1,600 degrees Fahrenheit after being held for one hour at that temperature.

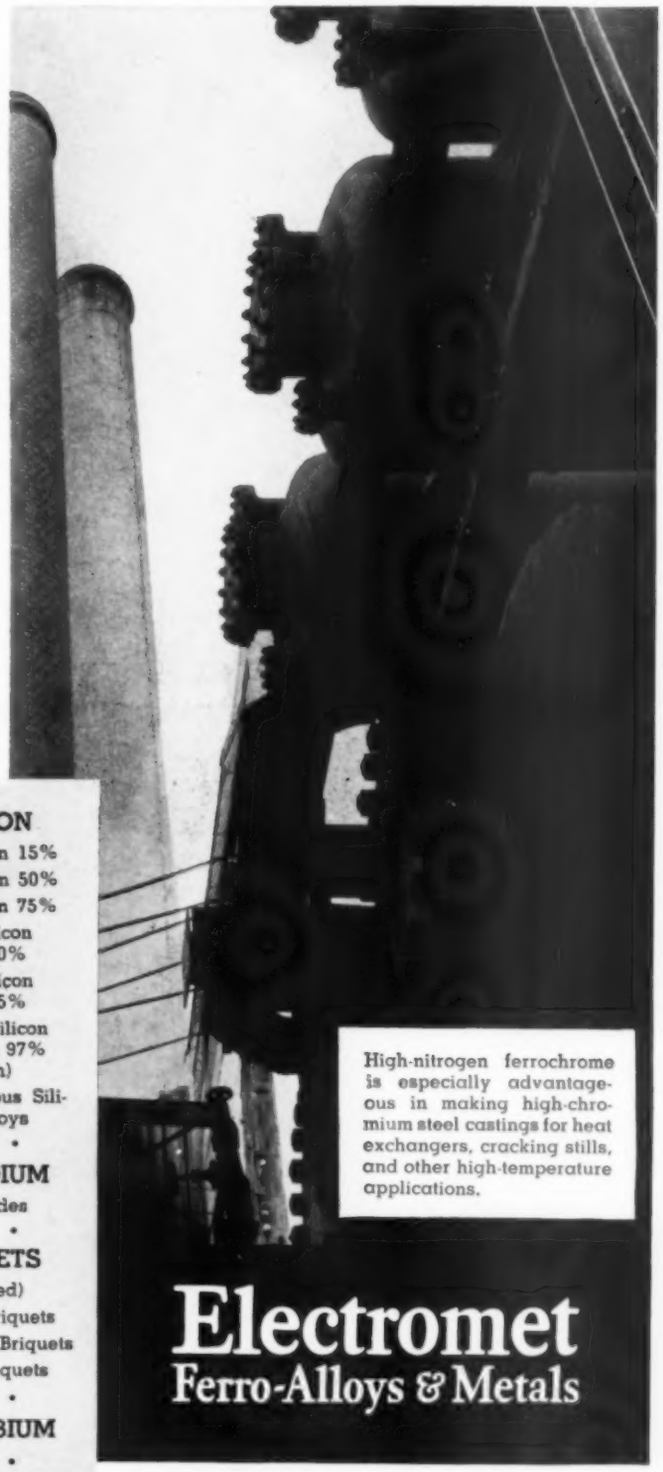
Electromet metallurgists will gladly explain the advantages of high-nitrogen ferrochrome and tell you the best ratio of nitrogen to chromium for your application. Write for full data.

ELECTRO METALLURGICAL COMPANY

Unit of Union Carbide and Carbon Corporation

UCC

Carbide and Carbon Building, 30 East 42nd St., New York



High-nitrogen ferrochrome is especially advantageous in making high-chromium steel castings for heat exchangers, cracking stills, and other high-temperature applications.

Electromet
Ferro-Alloys & Metals

CHROMIUM
Low-Carbon Ferrochrome (in grades, maximum 0.06% to maximum 2.00% carbon)
High-Carbon Ferrochrome (maximum 6.00% carbon)
High-Nitrogen Ferrochrome
Chromium Metal
Chromium-Copper
Miscellaneous Chromium Alloys

CALCIUM
Calcium-Silicon
Calcium-Aluminum-Silicon
Calcium-Manganese-Silicon

ZIRCONIUM
12 to 15% Zirconium
35 to 40% Zirconium
Aluminum-Zirconium

SILICO-MANGANESE
All grades including Silico-Spiegel

MANGANESE
Standard Ferromanganese 78 to 82%
Low-Carbon Ferromanganese
Medium-Carbon Ferromanganese
Spiegeleisen
Manganese Metal
Manganese-Copper
Miscellaneous Manganese Alloys

PRODUCTS OF A UNIT OF UCC UNION CARBIDE AND CARBON CORPORATION

SILICON
Ferrosilicon 15%
Ferrosilicon 50%
Ferrosilicon 75%
Ferrosilicon 80 to 90%
Ferrosilicon 90 to 95%
Refined Silicon (minimum 97% silicon)
Miscellaneous Silicon Alloys

VANADIUM
All grades

BRIQUETS
(Patented)
Chrome Briquets
Manganese Briquets
Silicon Briquets

COLUMBIUM

TUNGSTEN

Is there a ROYER Combination in your Budget for 1938?

If the answer is "yes" you may count on complete freedom from the disadvantages of old, expensive methods of conditioning sand. The many exclusive features of this equipment insure higher production and lower costs.

Here's what it will do—remove scrap, thoroughly condition your sand, increase permeability, distribute moisture content evenly, reduce the amount of new sand used, reduce the amount of facing sand used, eliminate ragged edges and drop-outs, reduce your percentage of rejects, and enable you to produce cleaner and better castings at less cost.

Decide NOW to install a

ROYER COMBINATION of SCRAP REMOVER & SAND SEPARATOR & BLENDER

USERS REPORT...

"75% Saving in Labor"
"50% Saving in Facing Sand"
"50% Saving in New Sand"
"10 to 20% Increase in Permeability"

ROYER
KINGSTON, PA.
FOUNDRY & MACHINE COMPANY

A request will bring additional evidence of the savings possible with ROYER equipment, or a ROYER engineer will call. No obligation, of course.

WISHING YOU A VERY HAPPY AND PROSPEROUS NEW YEAR

THE LAST DROP IS AS GOOD AS THE FIRST

WHATEVER the luck of the year just past, its little quirks and errors—mix the good with the bad in the test tube of time, pour in an ounce of human kindness, heat over the flame of friendship—and on Christmas morn its hue will be as rosy-red as a Dayton Core Oil drum . . . May that color glow through the foundry smoke of America throughout the coming year!

Standardize on Dayton Core Oil for 1938 and your core room will cease to be a source of annoyance.

We also manufacture the following materials—all scientifically compounded to give high heat resistance:

DOCO CORE WASH

OLD MASTER CORE WASH

DOCO BINDER & CORE PASTE

DOCO STEEL CORE & MOLD WASH

THE DAYTON OIL CO., DAYTON, O.

Faster, Finer TOOL GRINDING

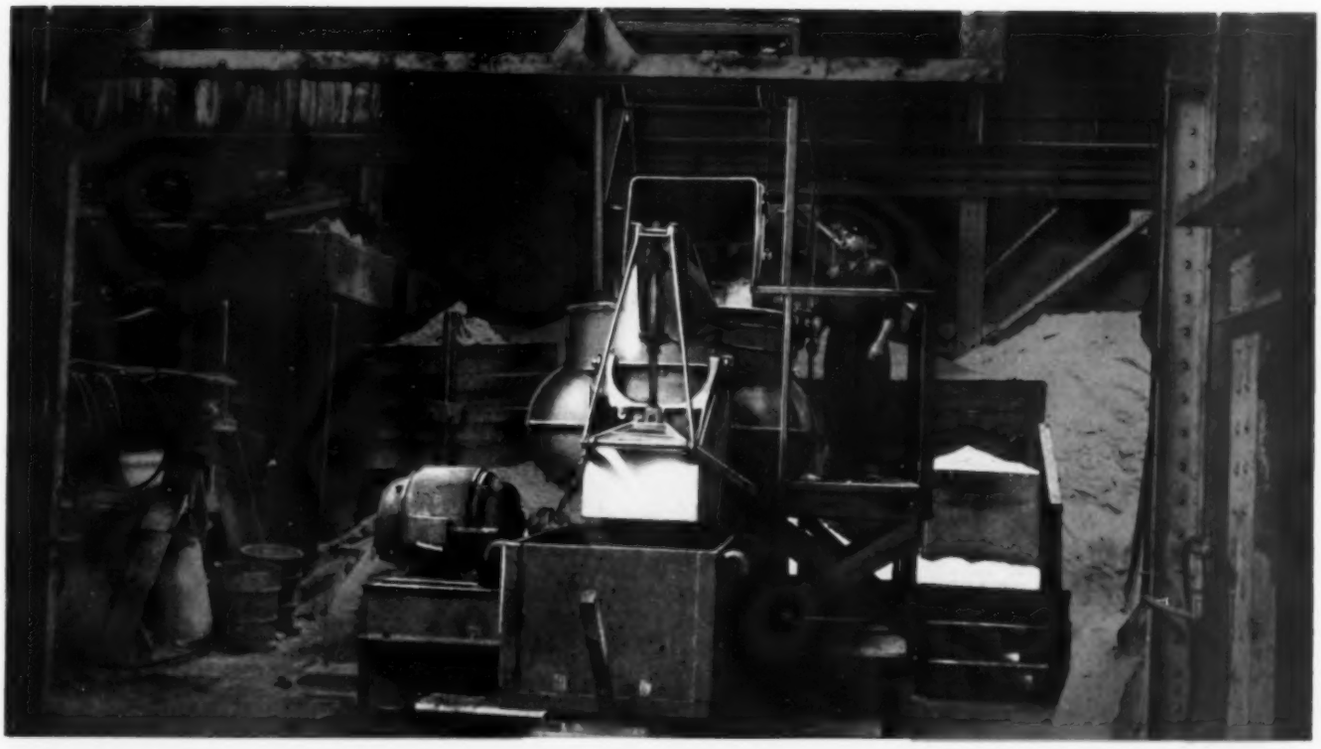
THROUGHOUT metal-working industries, abrasive wheels bonded with Bakelite Resinoid provide new efficiency in tool dressing. Strong, heat-resistant, cool-running, non-gumming, even-wearing . . . they cut cleaner, truer, faster. Their added safety is indicated by the fact that Bakelite Resinoid bonded wheels operate continuously on cut-off work at speeds up to 16,000 s.f.p.m.; on snagging, up to 8,500 s.f.p.m. Write for our illustrated booklet 15G, "High Speed Abrasive Wheels", which gives full details.

BAKELITE CORPORATION, 247 PARK AVENUE, NEW YORK, N.Y.
BAKELITE CORPORATION OF CANADA, LTD., 163 Dufferin Street, Toronto, Ont.
West Coast . . . Electrical Specialty Co., Inc., 316 Eleventh Street, San Francisco, Cal.

BAKELITE

BONDED WHEELS

FOR ECONOMICAL HIGH SPEED GRINDING



Speedmullors-

are now made in three sizes: Model "F" for conditioning 18 to 25 tons per hour; Model "G" for mulling 25 to 30 tons per hour; and Model "K" for preparing 50 to 75 tons per hour. All sizes are ideally applied to preparing facing, backing and core sands. Lower conditioning costs in your foundry now by installing a SPEEDMULLOR. Write for details!

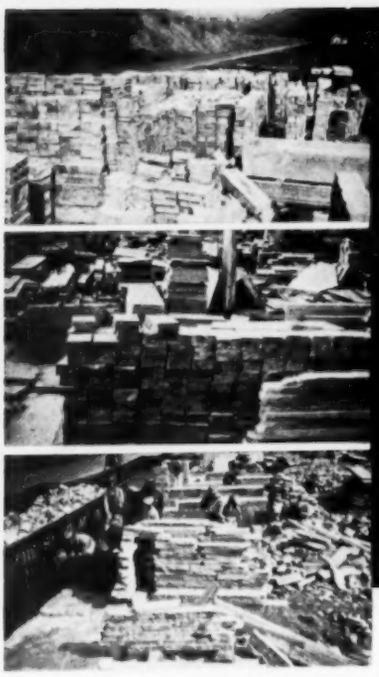
Mull More Tons Per Hour
Cut Mulling Time 50% to 90%
Closer Control of Sand Temper and Strength
Require Less H. P. Per Ton Mulled
Reduce Binder Requirements up to 50%
Need No Foundations
Mullers Last Ten Times Longer
Discharge Instantaneously (5 Seconds or Less)
Available on Free Trial

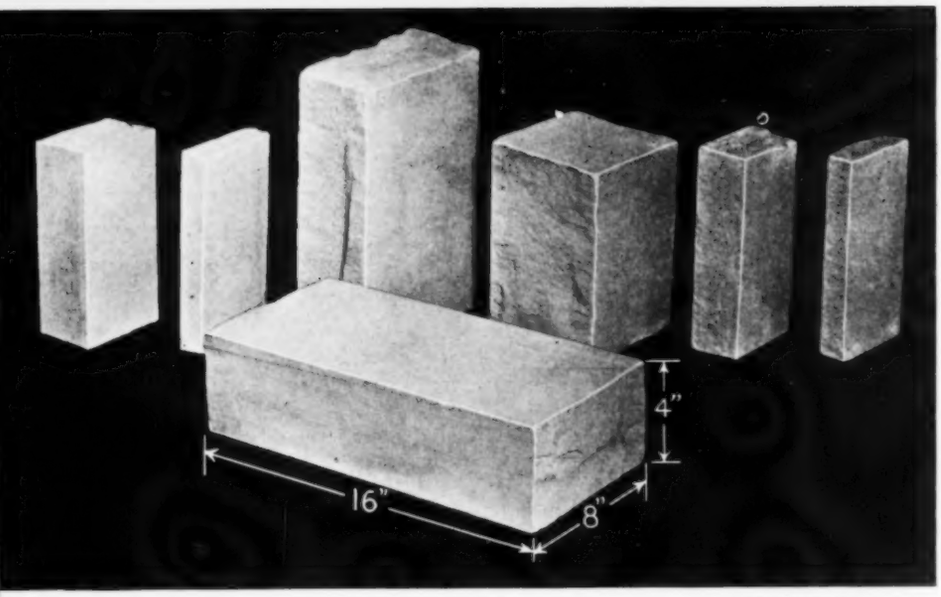
Increase Profits with

THE BEARDSLEY & PIPER CO.
2541 N. KEELER AVENUE, CHICAGO, ILLINOIS
SANDSLINGERS, SPEEDMULLORS, SAND HANDLING, PREPARING, AND MOLDING EQUIPMENT
REPRESENTATIVES IN PRINCIPAL FOREIGN COUNTRIES

Great Lakes Firestone

No. 3 *of a series*





PRODUCED by nature and fabricated by Great Lakes, this firestone when used for lining cupola melting zones, reduces refractory costs as much as 50%.

It is a very dense, fine grained, highly siliceous rock with a fusion point of approximately 3000° F. Resisting higher temperatures for longer heats, it has proven a most satisfactory and economical material.

At our quarries in Bluestone, Kentucky, Great Lakes Firestone is sawed and dressed in sizes best suited for your use. Special shapes are fabricated to specifications.

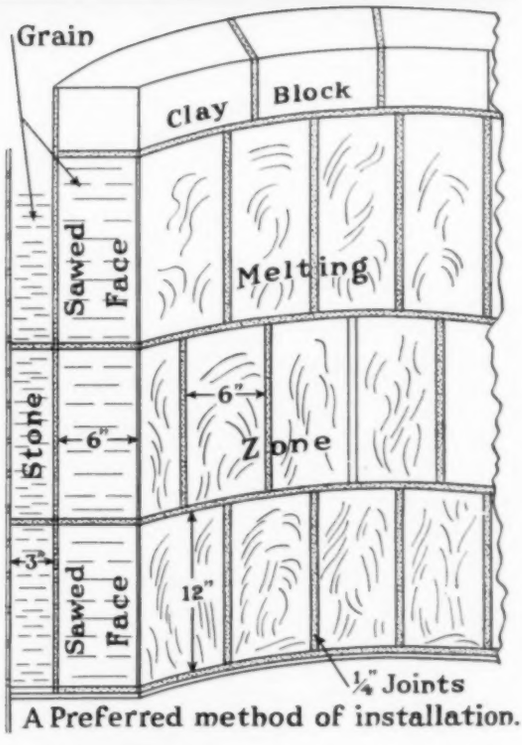
Melting Zone Blocks are furnished in rectangular shapes and sawed on 2, 4 or 6 sides in any size of 3 dimensions.

Slabs are sawed on 2 sides and furnished in any thickness from 1½" up. *When laid in the usual manner for patching, the grain of the stone runs at right angles to the fire, reducing the tendency to spall.*

Brick Shapes, such as 9 inch straights and splits, are furnished sawed on 2, 4 or 6 sides. They serve many useful purposes—lining ladles, etc.

Write for quotations—*today!*

Trial lots at special prices. And remember—our refractory service men are at your call. We need your inquiry to start the ball rolling.



A Preferred method of installation.

Molding Sands
Bank Core Sands
Lake Core Sands
Crude Silica Sands
Ottawa Silica Sands
Silica Flour
Great Lakes CoroiL
Bentonite
Clay Bond
Fire Brick
Nepheline Syenite
Refracto Fire Clays
Refracto Firestone
Mica Schist
Ganister-Silica Grits
A B C Foundry Coke

Great Lakes Foundry Sand Co.

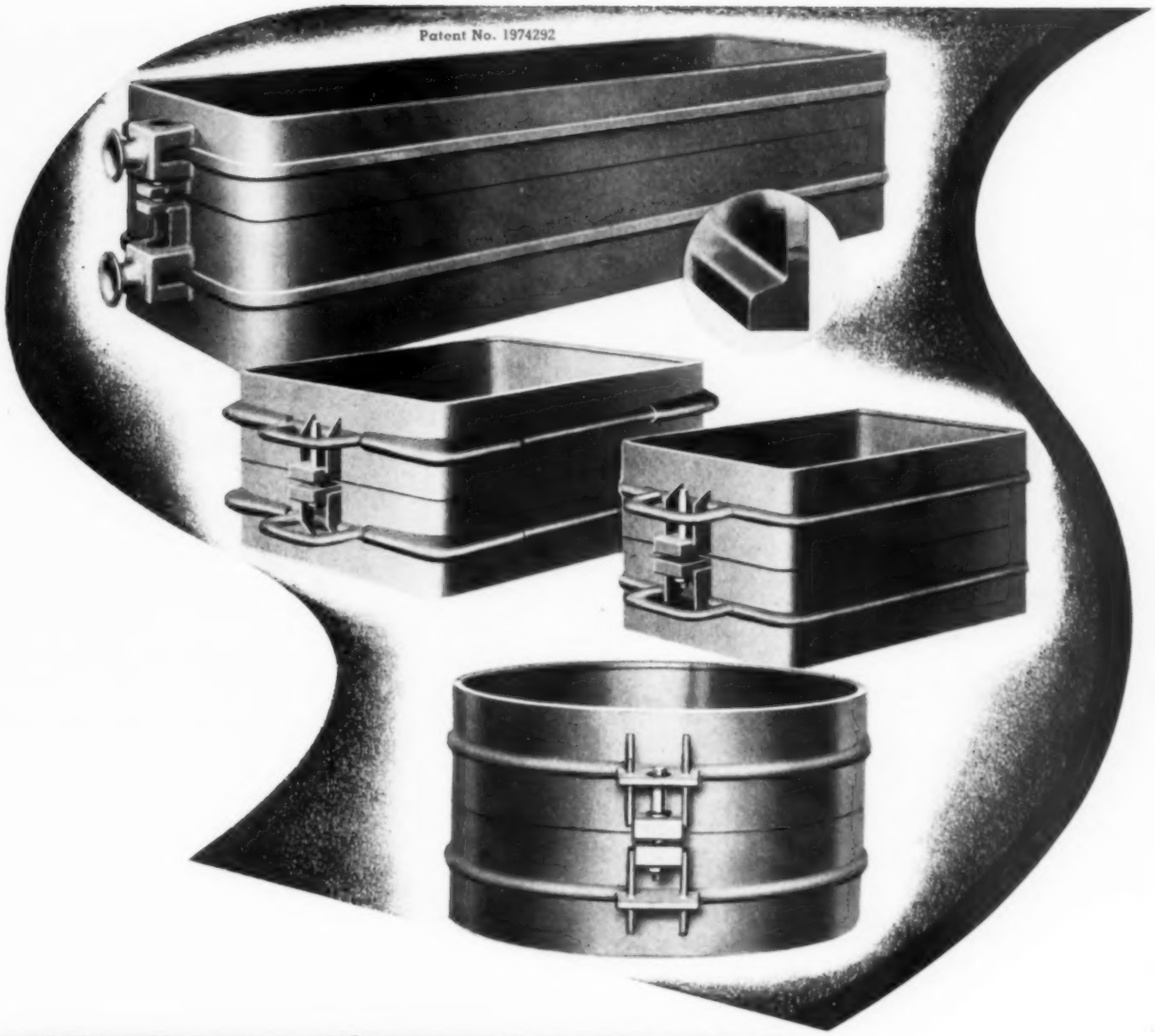
BUY GREAT LAKES!

United Artists Bldg. Detroit, Michigan

Miners—Processors—Foundry, Metallurgical and Sand Blast Service

BLAST SANDS
Diamond
Flint Shot
Gem Quartz
Muscatine
Gold Jacket

Steel and Metallic Abrasives
Alloy Iron Nozzles
Stoody Borium Nozzles
Mill Stars
Limestone
Dolomite



Greater Profits with STERLING FLASKS

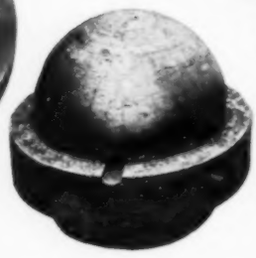
In 60% of the nation's foundries Sterling flasks are saving time, man-energy, labor, materials, floor-space—with easier handling, resulting in more moulds per man per day.

STERLING WHEELBARROW CO.

7100 W. WALKER STREET
MILWAUKEE, WISCONSIN

NICKEL *is a good* REPUTATION BUILDER *for the alert steel foundry*

• *Vapor channel casting for refinery use. Manufactured from Nickel Alloy Steel. Produced by Beaumont Iron Works, Beaumont, Texas.*



• *Cast Nickel Steel pintles (16 in. dia.) used for over 20 years on Panama Canal lock gates.* (LEFT) *Pressure-side pintle, showing slight wear.* (ABOVE) *Slack-side pintle showing dirt and scale, no wear. Made by Continental Roll & Steel Foundry Co.*

ON EVERY HAND industry is demanding greater efficiency from equipment. Steel foundries are well aware of these demands and enterprising firms are strengthening their position with machinery users and producers by using Nickel.

Not only is industry at large seeking better and longer lasting castings for a wide variety of purposes, but petroleum, railroad and general engineering activities offer especially fertile fields.

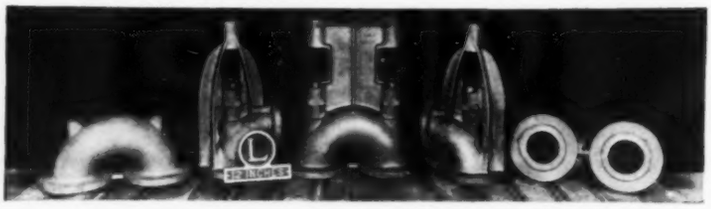
The extremes of high and low temperatures, together with high pressures, that petroleum equipment must withstand call for castings that are resistant over a broad temperature range to shock and fatigue stresses. Castings for railroad use are being made lighter yet stronger, thereby cutting down dead weight. Good wear-resistance is universally required.

Today, all of these requirements can readily be met by castings of Nickel Alloy Steel. For there is a suitable Nickel Alloy Steel composition for each particular job that will render excellent service.

Pictured here are a few of the many applications where these tough, strong compositions give lasting performance.

Consultation involving the application of Nickel to your particular problem is invited.

• (ABOVE) *Parts for oil pump operating at sub-zero temperatures—made of cast 2½% Nickel Steel by Lebanon Steel Foundry, Lebanon, Pa.* (BELOW) *Chilling machine fittings of same material by same producer offering high impact resistance at low temperatures.*

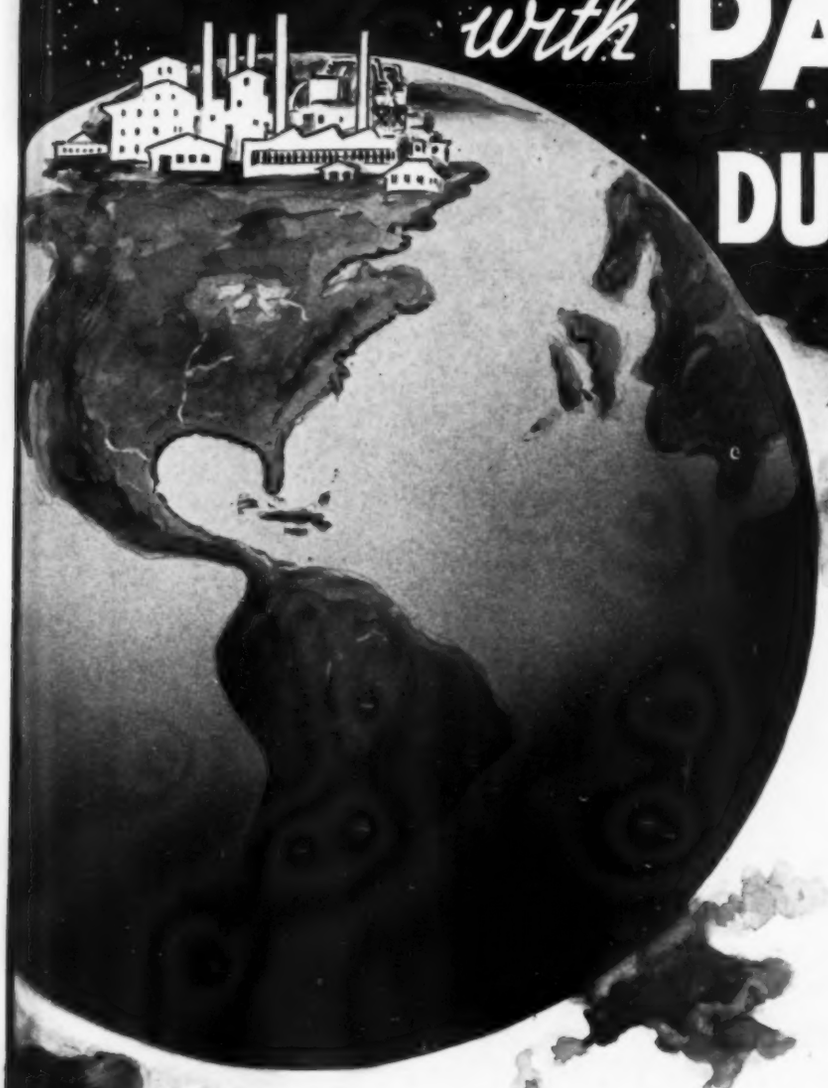


• *Railroad truck bolster of cast Nickel-manganese Steel made by Buckeye Steel Castings Co., Columbus, Ohio.*

NICKEL
CAST STEELS

THE INTERNATIONAL NICKEL COMPANY, INC., 67 WALL ST., NEW YORK, N. Y.

Sitting On Top of the World with PANGBORN DUST COLLECTING EQUIPMENT



4112 PANGBORN customers enjoy mental and physical freedom from dust worries . . . *are sitting on top of the world* when it comes to reliable, economical and trouble-free DUST CONTROL . . . because of Pangborn dust installations.

Pangborn metal frame, cloth filter Dust Collectors are backed by more than thirty years' specialized experience in collecting and salvaging destructive or valuable dusts. These collectors quickly and efficiently control dust at its source and convert it from harmful waste into profitable commercial by-products.

It is quite possible that you have a dust problem . . . big or small. No matter what size, we can be of considerable service to you . . . pointing out short cuts in cost . . . steering you clear of "headaches" . . . relieving you of all uncertainty regarding dust nuisances.

If you, too, would like to be sitting on top of the world as far as your Dust worries are concerned . . . COME TO PANGBORN. *Worth writing about, isn't it?*

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at the plant of ANY FOUNDRY COMPANY,

at ANYWHERE, U. S.

The Claude B. Schneible Company hereby guarantees that if within a period of five years from above operating date, the Schneible Multi-Wash Collector or any part of it requires replacement due to wear suffered under regular operating conditions, that the said Claude B. Schneible Company will supply the required repair part(s) without cost F. O. B. point of manufacture.

It is understood that this guarantee covers the Schneible Multi-Wash Collector only under regular dust collecting operations, and shall not cover undue corrosion that may be caused by corrosive chemicals or gases.

Date August 14, 1937

CLAUDE B. SCHNEIBLE COMPANY,
CHICAGO, ILLINOIS

By Claude B. Schneible
CLAUDE B. SCHNEIBLE

The Senior Multi-Wash Collector

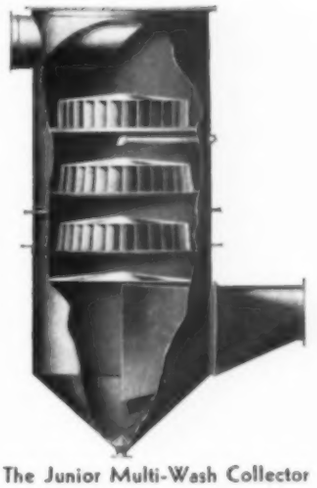
Schneible Multi-Wash Wet Method Dust Collectors have no internal moving parts, nothing to rapidly wear, break or burn. They are unaffected by heat or cold, have no nozzles or spray heads to clog, no screens, grids or filters to clean, and they occupy a minimum of space.

They are the most simple, efficient dust collecting mediums yet devised and provide long-time maintenance-free operation.

Made in two Models: the Senior for very highest efficiency; and the Junior for low concentration and large average particle size. The Junior may be easily rebuilt into a Senior.

The Senior multi-washes the air thirteen times. The Junior multi-washes the air five times.

All Schneible Multi-Wash Collectors *are guaranteed for 5 years* — no other dust collectors can give you the *investment protection* guaranteed by Schneible Multi-Wash Collectors!



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Not content with the production of high quality iron, uniform in every respect, Republic maintains a corps of metallurgists whose entire time is devoted to foundries. These men are both scientists and practical foundrymen. They are experienced in all types of foundry practice. They know where to look for the cause of foundry trouble and how to overcome it.

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The Foundry

Conflicting Demands Hamper Progress

METALLOGRAPHY has played an important part in the progress of gray cast iron, especially during the past decade. Study of the structure of the cast metal and correlation of structural data, knowledge of composition and information on engineering properties have provided a means for further improving particular properties in gray cast iron and thus have enabled the foundryman to produce the material best suited to a specific engineering need.

Importance of metallography as a means of examination in the field of cast iron is illustrated by the fact that while the metal in two castings may have the same chemical composition, the castings may possess entirely different physical properties, due to differences in physical structure. The answer to these variations is apparent to the metallographist.

Probably the application of metallography to gray iron is in its infancy. With further exploration, the metallographic laboratory will be able to determine rather accurately certain physical properties of cast iron from a study of the micrograph. At the same time, greater knowledge of the physical structure will point to new applications, thus enabling foundries better to meet competition from other forms of fabrication.

Developments in metallographic application must be directed along feasible channels or benefits will be lost entirely. A recent regional foundry conference developed the interesting fact one buyer of a specialized gray iron casting insists on specifying the microstructure of his castings. This may be entirely satisfactory in an isolated case of this kind, but should be watched carefully by the gray iron industry. With customers trying to specify simultaneously c h e m i c a l composition, physical properties and now microstructure, the foundryman may be confronted with an impossible situation.

In the last analysis the customer wants a casting to serve a certain definite purpose. Instead of imposing burdensome restrictions upon the modern foundryman operating a technically controlled shop, he should be given detailed information on the service requirements of the casting and then allowed to use his own professional skill, knowledge and technique to produce the type of castings which will meet these demands. In this way the buyer should benefit greatly.

A Crowd Is Coming

FOUNDRYMEN throughout the country are looking forward to the Cleveland convention of the American Foundrymen's association next May. Information from national headquarters indicates a record breaking attendance.

While Cleveland is fortunate in being well provided with hotel accommodations, it is possible the large crowds may tax the capacity of its leading hosteleries. To avoid possible disappointment later, the hotel reservation blanks recently mailed to all members of the A. F. A. should be filled in and returned to the Cleveland committee at once.

Win a Prize for Safety

WHEN football rings down the curtain with the various bowl games New Year's day, a different type contest will be starting in the gray iron foundry industry. As announced on page 46 of this issue, the Gray Iron Founder's society is sponsoring a prize contest for safety among employes of its members. What better incentive and opportunity can be offered to interest workers in improving the safety record of foundries?

The Season's Greetings

AS THE greatest of all holidays again approaches, the staff of THE FOUNDRY joins in the wish that yours may be a Merry Christmas, and that the New Year will be happy and prosperous for all.

Frank G. Steinebach
Editor

Fig. 1—One of the important features of foundry control is accurate temperature determinations, and in this plant a definite procedure has been developed to that end

Nonferrous Foundry Builds High and

MANUFACTURE of nonferrous castings for pressure work requires not only close technical control and knowledge of alloys which are most suitable, but also calls for careful control of melting and pouring, as well as strict observance of details in molding practice. No one of those factors probably is more important than the other but they are so closely interrelated that failure in any one usually results in defective castings.

Use Three Standard Alloys

One of the leading foundries engaged in production of castings for high and low pressure applications is the Detroit Lubricator Co., Detroit, manufacturer of radiator valves and other fittings for low pressure, locomotive lubricators and other castings for high pressure steam up to 250 pounds per square inch, and electrical refrigerator control equipment. Since that firm gives due consideration to the several factors mentioned previously, it will be of interest to describe briefly some of the procedures followed in its foundry.

At the present time the foundry is operating on a capacity of 24,000 pounds per day. The major portion of the castings are made in three alloys. One for radiator valves and other low pressure work is composed of 78 per cent copper; 2.50 per cent tin; 10 per cent lead; 9 per cent zinc, and 0.5 per cent nickel. A second for locomotive lubricators and other high pressure fittings contains 84 per cent copper; 3 per cent tin; 5 per cent lead; 7 per cent zinc, and 1 per cent nickel. The third for refrigerator equipment contains 77 per cent copper; 5 per cent tin; 10 per cent lead; 6 per cent zinc, and 2 per cent nickel.

All of the alloys contain nickel. As a matter of interest, it may be stated that the Detroit Lubricator Co. was one of the first nonferrous foundries to use nickel in its alloys. That procedure came about through a peculiar circumstance. In the early days nickel was believed to have a deleterious effect on nonferrous alloys, and consequently, that element was maintained at a minimum point. However, one time the firm unknowingly received some ingot metal containing appreciable quantities of nickel which caused considerable trouble until the cause was ascertained.

Melted in Electric Furnaces

Instead of returning the *contaminated* ingot to the supplier, it was placed to one side, and numerous experiments performed to determine exactly the effect of nickel. Eventually, it was found that nickel increased the fluidity of the alloy considerably so that it was advisable to lower the pouring temperature 75 to 100 degrees to eliminate the trouble encountered. Nickel also produced denser metal. When those facts were established, the firm became a user of nickel in its alloys.

All melting is accomplished in rotating, indirect arc furnaces made by the Detroit Electric Furnace Co., Detroit. Four of the furnaces are of 1000 pounds capacity, two are of 200 pounds capacity, and one is of 2000 pounds capacity. The latter is employed for making ingots from scrap materials while the others are used in the foundry proper. Furnace charges for castings are composed of the firm's own ingot and return scrap and turnings, 10 per cent electrolytic copper, and

Low Pressure Castings

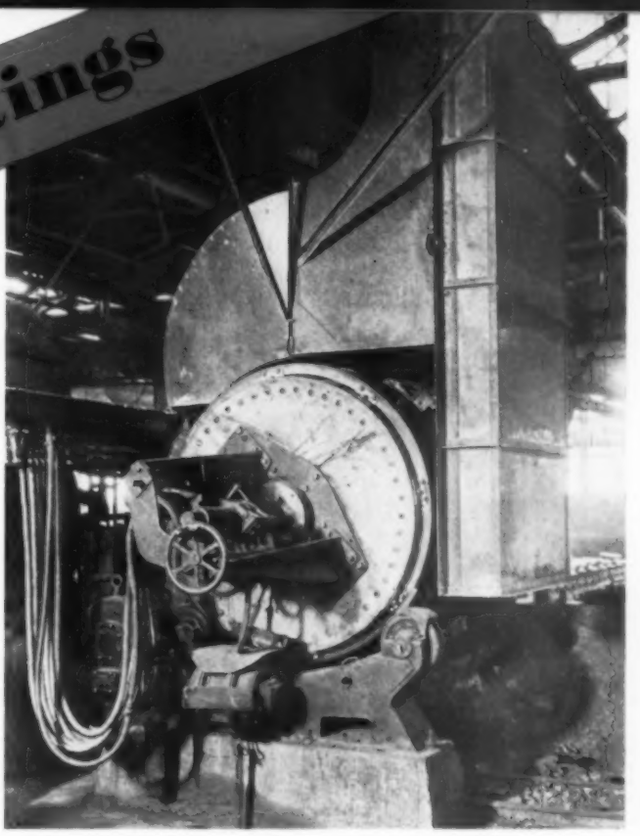


Fig. 2—Indirect arc, rotary type electric furnaces employed for melting are surmounted by hoods which can be raised and lowered. The hoods carry away any obnoxious fumes

By EDWIN BREMER

sufficient tin, zinc and nickel to insure the proper composition of the final metal for pouring. A 1000-pound charge requires from 35 to 40 minutes melting time with consumption of about 150 kilowatts of electrical energy. As shown in Fig. 1 the melting furnaces are hooded to remove all smoke and fumes.

Ingots made by the firm for its own use are comprised of about 65 per cent purchased turnings, and 35 per cent concentrates and metal-bearing wastes from the recovery and salvage departments. As previously mentioned the firm's own return scrap, turnings, etc. are used directly in the foundry furnace charges. Turnings, whether home or foreign, are dried in a rotary, gas-fired kiln to remove any oil or other combustible matter. The kiln is about 25-feet long. The temperature is maintained just high enough to insure that the oil is driven off the turnings. After passing through the drying kiln, the turnings are run over a magnetic separator to remove any iron that may be present.

Purchased turnings and scrap are charged into the 2000-pound furnace with some borax and soda ash for a flux. The charge is melted and refined in about 1 hour, and then poured into ingot molds. Each heat is analyzed to ascertain its composition, and the ingots are forwarded to the weighing room where the charges for the foundry furnaces are made up. The charges are weighed into sheet steel buckets holding 1000 pounds each, which are transported to the furnaces on small cars. Screenings from the foundry floor sweepings, slag from the ingot making operation, and skimmings from the foundry pouring ladles are put through a Marcy mill and then over a Wilfley concentrating table to

Fig. 3—A row of drags laid out with the cores in place awaiting placement of the copes

separate the metallics from the gangue. Metallics or concentrates as they are termed are dried in the previously mentioned kiln, run over the magnetic separator, and sent to the ingot-making department.

All pouring is conducted under strict temperature control, with a temperature range from 2125 to 2140 degrees Fahr. One man is delegated to that operation as shown in Fig. 2 and an open-end thermocouple is employed. A definite procedure is employed in temperature determinations to insure correct and concordant results. The method followed is to dip the thermocouple into the metal and stir sufficiently to break the slag and oxide film. Then the thermocouple is lifted out slowly, and just before the end of the couple emerges from the molten metal, the needle of the temperature indicating instrument jumps upward. The highest point reached on that jump is taken as the correct temperature of the molten metal.

Castings made by the company range in weight from 1 ounce to 100 pounds. All are made from plated patterns which contain from 44 patterns in the case of small hexagonal nuts to 1 in the case of a locomotive lubricator. Molds are made by hand, on plain squeezer machines made by the Tabor Mfg. Co., Philadelphia, and on a roll-over jolt machine made by the same firm. Average molding machine production ranges from 110 molds per day in the case of cored work to 129 molds per day for solid or uncored work. On hand molding the average ranges from 85 to 95 molds per day.

To obtain a good smooth surface on the castings, and to insure sharp edges on the mold cavity, all mold faces are sprayed with a dilute solution of molasses water and then sprinkled with flour. One practice that the Detroit Lubricator Co. has adopted from the malleable and gray iron fields with excellent results, is the use of the strainer gate as shown in Fig. 3. At the present time approximately 75 per cent of the work uses that device.

On some types of work the firm has found it advantageous to fasten squeezer blocks directly to the heads of the machines. These blocks contain projections which are forced into the sand at certain points to make it denser. On some of the bottom boards, the same principle is employed, except that the projections are placed along the four edges, and exert a peining effect. Bottom boards are pressed into place and left on the drag until the mold is poured. Platens of the molding machines are heated with small gas jets to maintain them at the best operating temperature so that the sand does not stick, or become too dry.

The molder's duties are to make the molds, spray and flour them, set the cores, shake the molds out and temper his sand. One helper divides his time between two molders, and his duties (*Please turn to page* 77)

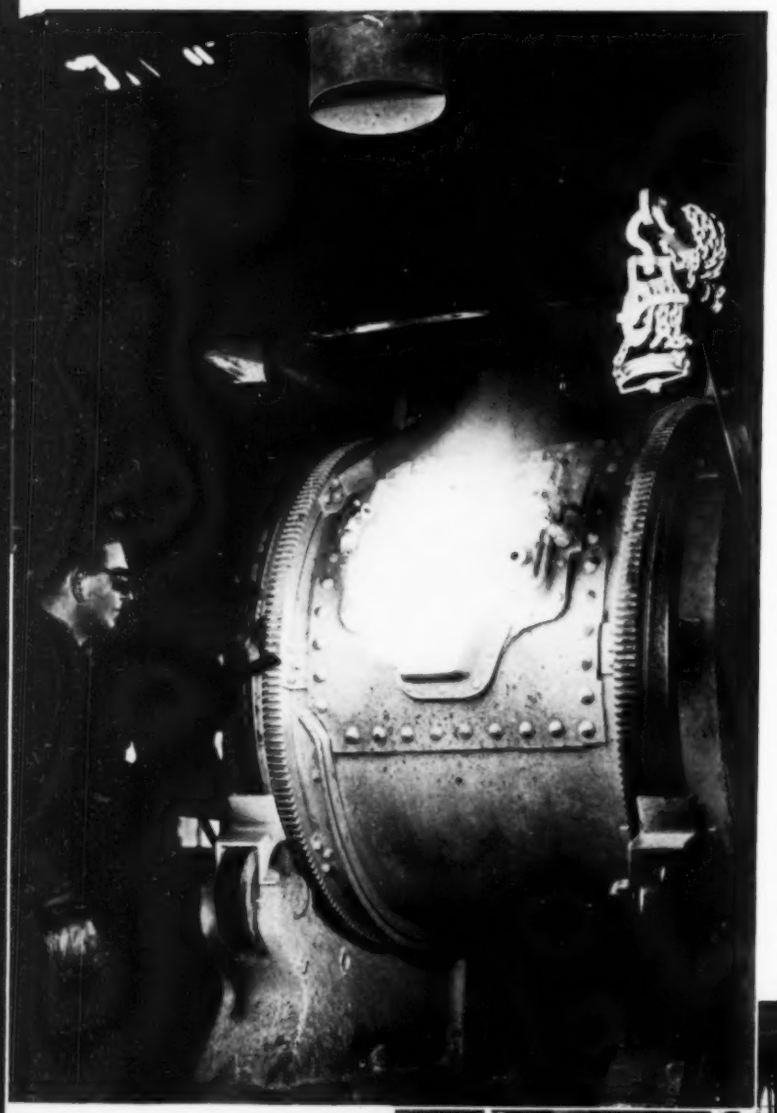


Fig. 4 (Left)—An interesting photographic study of the electric furnace. Fig. 5 (Below)—A view of the core room showing the benches for cores made by hand

Gating Nonferrous Castings

By N. K. B. PATCH

Fig. 1—Various steps depicting the formation of an air bubble and its accompanying dross. From left to right: Cessation of pouring; pouring resumed and bubble with dross starting to form; bubble taking spherical form, and far right bubble and dross enter casting

LEADED bronzes, 80 per cent copper, 10 per cent tin and 10 per cent lead; 80 per cent copper, 5 per cent tin and 15 per cent lead, and the higher leaded bronzes up to and including copper 50 per cent, lead 50 per cent, are relatively fluid when cast. They are gated in a similar manner to the phosphor bronzes but have a more seeking effect and will burn into the sand considerably more if poured at high temperatures. In many castings sections are so thin that temperatures must be higher than would be desirable. Where castings permit, these metals may be poured at relatively low temperatures, where the seeking effect is not quite so marked. However, all gates, runners, sprues and cavities for the castings must be covered with plumbago or graphite to prevent this seeking or burning-in effect.

Leaded bronzes also tend to shrink materially. Risers must be provided to insure feeding as with the alloys previously described. In the best practice the flow of metal into the mold is controlled by proper size of sprue. Kept full during the entire period of pouring, this will give the exact standard of flow desired. Attempting to control the flow into the mold by the rate of pouring necessarily means that at some time or even several times during the pouring, the sprue will not be full. Air will go with metal into the mold as shown in Fig. 1. Slags and drosses are formed, resulting in defects which later are hard to explain unless this condition absolutely was seen during the pouring period. Emphasis again is placed on the desirability of keeping the sprue full from the beginning to the end of the pouring period. Size of the sprue should insure adequate supply of metal but must not be too big to be kept completely full during the entire pouring period.

Some of these alloys apparently do not need much feeding but in reality they do need feeding. Also they need to be cooled promptly after the mold is full. Presence of chills has been found desirable for some of these alloys. Chills function more satisfactorily thinly coated with a little French chalk or lime. Chills under the best conditions should be warm enough to prevent condensation of moisture from the surrounding sand, a direct cause of blows or bubbles in the casting. Agitation of this type of alloy is not desirable. The gating should permit a very quiet flow of metal into the mold. These metals are fluid and a number of streams will unite readily if temperature permits. Minimum number of streams into any one mold (*Please turn to page* 78)

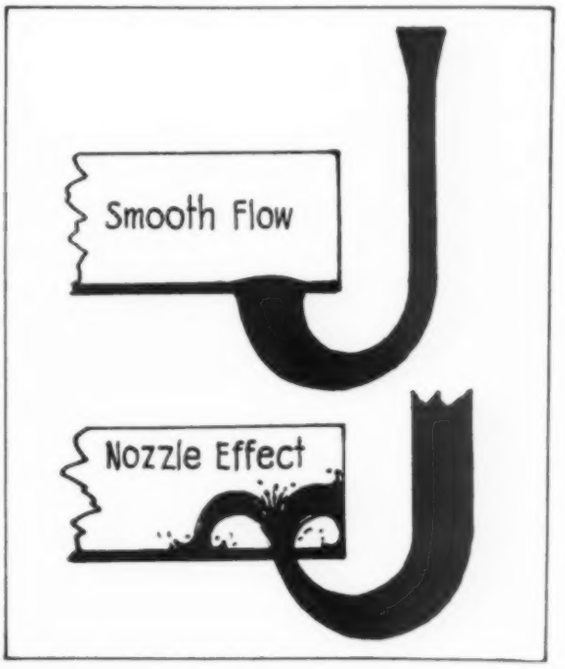


Fig. 2—Horn gate with large end at casting cavity gives smooth flow while if placed in position below, a nozzle effect is given

Makes Diesel

By
JOHN E. OLSON and

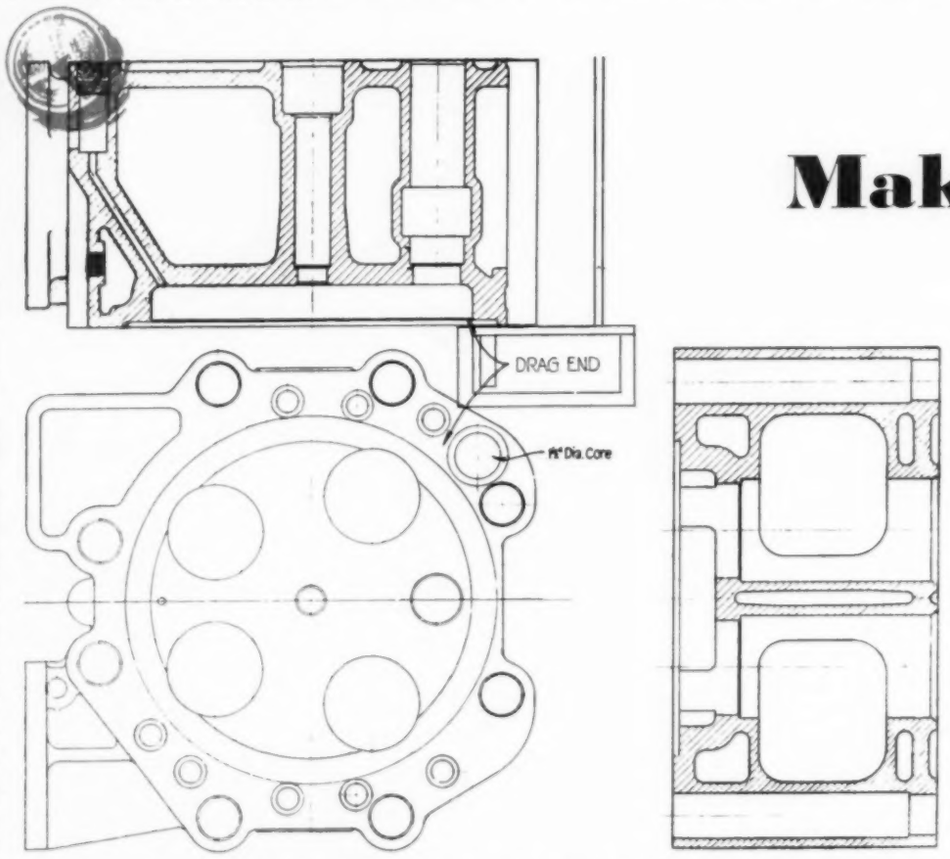


Fig. 1—Various views of a diesel engine cylinder head which requires use of 17 different coreboxes to produce the 34 cores employed in its manufacture

PRESENT trend in diesel engine manufacture is to reduce the weight per horsepower. This is accomplished by thinner sections in the castings and a stronger, denser iron. The engines are guaranteed for 5 years and are expected to last for an ordinary lifetime. Users in many fields depend on these engines for a steady flow of power, ability to withstand the sudden stress of an emergency overload, and to operate economically for long uninterrupted periods.

The degree of success in producing castings of this type is governed by the materials and methods employed. Undoubtedly many methods and metal compositions can be used. The present description covers the experience of the writers.

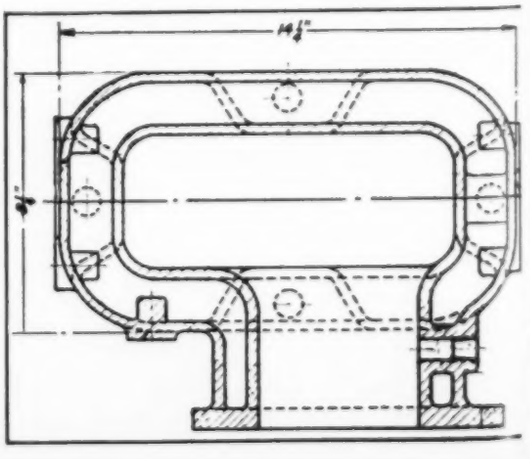
In making satisfactory cylinder heads and exhaust manifolds, good molding and core making practice is the prime prerequisite. The sand and the bond may vary to a great extent, but permeability and good venting are necessities. The gating system is an important factor in the production of good castings.

Many Cores Are Used

Fig. 1 shows some views of a diesel engine cylinder head. Seventeen different coreboxes and 34 different cores are necessary to make this casting. All cores are rammed by hand, most of them in half sections and pasted together after drying. Great care must be taken in venting and drying the cores. They must be thoroughly dry, but not burned, to stand up under the pressure and the temperature of the metal when the job is poured. Venting is equally important to prevent a high scrap loss. The cores are coated with a good grade of blacking that stands up well, causes no disturbance when pouring and facilitates the cleaning of the casting.

Cores are made from a good grade of silica sand, usually varying from 40 to 80 mesh. The core oil has a good base of oxidizing oil. The core sand mixture contains 60 parts of sand to 1 of oil.

Great care must be exercised during the assembling of these cores to dry the pasted and blackened sections thoroughly. Careful work is necessary when placing the cores in the mold to obtain the proper thickness in the various sections. Thin sections and close allowances, with the strain and pressure the head is subjected to under operating conditions, makes this operation one of the more important in the production of a good casting. Chaplets also come under consideration. They must hold the cores securely in place and also must fuse completely with the metal or the chaplet



Engine Castings

ELMER J. CARMODY

locations will be the source of leaks or water seepage when the casting is water pressure tested.

Cast steel flasks give sufficient space for from 3 to 4 inches of sand to be rammed all about the pattern. The cope is a cover core on which is rammed a runner box.

The sand is a blend of several grades each of which confers some desired property to the composition A natural clay bond sand, a coarse silica sand, pitch, and used molding sand are the ingredients. The proportion of each depends on the condition of the used sand. When the permeability is low, coarse silica sand has been employed advantageously to increase the permeability. It is desirable to have a sand of over 200 dry permeability and a green strength of at least 5 pounds.

Blacking Should Penetrate Sand

The pattern is mounted and the mold is rammed on a jolt-roll over machine. It is finished and blackened with a good grade of blackening. Care must be used not to get the blacking too thick, because very small allowances are permitted on this casting. It is desirable to have blacking that will penetrate the sand rather than one that will *pile up*. The molds are dried in gas-fired ovens at a temperature of approximately 600 degrees Fahr. until thoroughly dry or at least until the moisture is well driven back from the face of the mold. Both mold and cores are allowed to cool before coring and closing to prevent an accumulation of moisture that might tend to produce a defective casting.

It is exceedingly important to get clean iron into the mold. Any slag, dirt, or dross that may be washed into the casting may lodge in a thin section and cause the piece to be scrapped. It is also beneficial to have a fairly slow input of metal to prevent any undue disturbance while pouring.

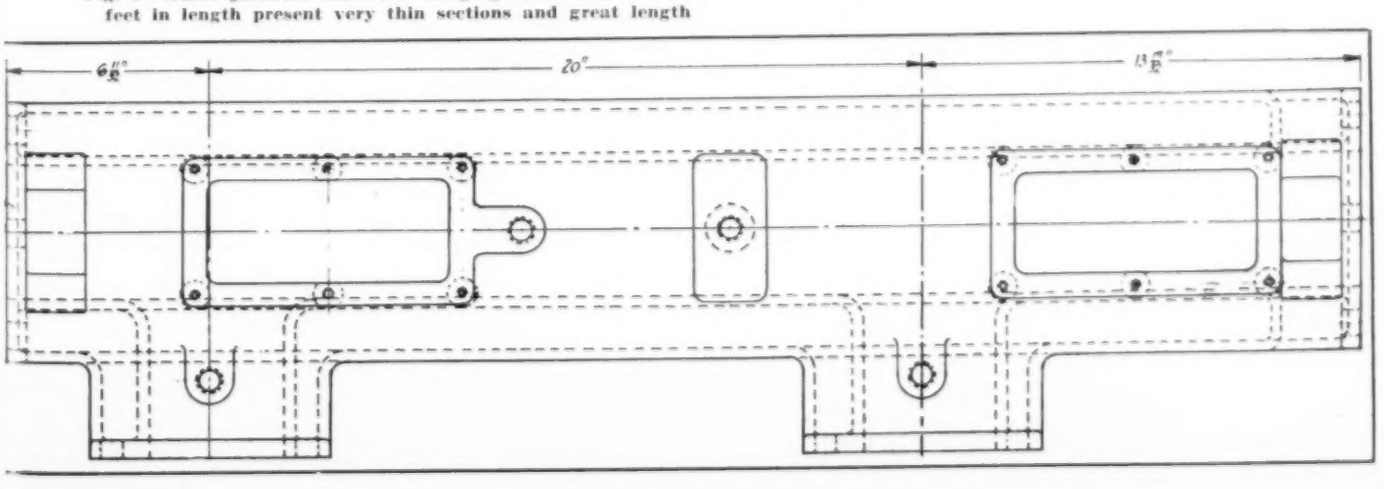
The most successful gate employed on this head was a bottom inlet trap gate, as shown in Fig. 3. *A* is the pouring basin which should be large enough to allow most of the dirt in the iron to rise to the top during the pouring operation. Clean iron will then go down the sprue *B* to the metal reservoir at *C*. To leave this reservoir the iron must pass through the opening *D* which is covered with a metal skimmer to prevent any dirt from entering the casting through the gate *E* with the first rush of iron. After the iron rises above the opening *D* the metal skimmer serves no purpose for the dirt will all stay on top of the iron in the reservoir *C*. The skim core *F* then acts to restrain the dirt from entering the casting. The core *F* is not a perforated core, as the core in this case is functioning below the casting level and serves only to force the clean iron under it and up the passage *E* into the casting *G*, leaving the slag, dirt, etc. at the top of the reservoir *C*.

Gives Dimensions of Gate

Approximate dimensions of the gating system for this particular casting that requires a little in excess of 500 pounds are as follows: Down gate sprue *B*, 1¼-inch; reservoir *C*, 2½ inches wide, 3 inches deep and 4 inches long, and area *D* and gate *E*, 2½ x ½-inches.

The iron enters gently and slowly at the bottom, thereby avoiding any rush of metal that might disturb the cores. There is no drop of metal over the cores. Cutting-in and metal penetration of the cores is practically eliminated. A minimum of disturbance is experienced, and if for any reason the pouring should be stopped, the iron in the gating system will remain at the same level. The iron in the mold and the dirt will still be held back from entering the mold. This type of gate is much to be preferred over a horn gate or inlet gate in that the iron has a chance to throw off impurities, that will be held in the trap and only clean metal admitted to the casting. Slag or dross in a stream of metal entering a mold on the same principle as water going through a hose cannot clean itself of these impurities.

Fig. 2—Water jacketed manifolds ranging from 40 inches to 8 feet in length present very thin sections and great length



There is a likelihood of defects showing up in the machining or grinding operations later, causing the loss of the casting to the foundry, and a still larger loss in the machine shop, and a series of cumulative troubles from there on.

A riser approximately 3 inches in diameter and 8 inches high is used with proper necked seat. It is placed directly above the heavy section in the center of the casting. No porosity is permitted in this section as it is later bored and finished for the fuel injector. Ā commercial preparation that acts as a heat insulator is placed on the metal as soon as the metal starts to come up in the riser. This is sufficient when applied to a thickness of nearly ½-inch to keep the riser alive and feed this heavy section to prevent any unsoundness. It has been found that churning this section, formerly thought necessary, is not essential to promote soundness.

Iron to pour these heads successfully was found to be in a relatively narrow range as far as the composition and amount of the elements are concerned, as follows: Silicon, 1.80 to 2.00 per cent; carbon, 2.90 to 3.10 per cent; manganese, 0.80 to 1.00 per cent; sulphur, less than 0.12 per cent; phosphorus, less than 0.20 per cent; and nickel, 1.25 per cent.

Iron melted in the cupola came across the spout with a silicon content of approximately 1.50 per cent. Sufficient 80 per cent ground ferrosilicon was added to bring the content up to the desired amount. It was found that the silicon content was made more effective when part of it was added at the spout. The nickel also was added at the spout in the form of shot. This iron has a consistent tensile strength of 50,000 pounds or more per square inch.

Steel Mixture Machines Readily

The steel content is relatively high. Formerly a mixture containing 40 per cent steel was employed for these heads and the number of rejections was rather high. In the heavy section in the center, both internal chills and churning were tried at different times to promote solid metal for this section, rather unsuccessfully. When the steel content of the iron mixture was raised both internal chills and churning were eliminated. Another advantage of metal of this composition was the fine-grained, dense, well dispersed graphite structure obtained. Dense metal is a necessity for the pressures used in a diesel cylinder head. When water-tested under pressure these heads were exceptionally free of rejects due to porosity. The metal machined readily.

The metal is melted at as high a temperature as possible. It is desirable to have iron leaving the cupola as near 2800 degrees Fahr. as possible, or in excess of this, partly on account of the alloys that are added and partly because it is desirable to pour these heads at a high temperature, in excess of 2650 degrees Fahr. and preferably above 2700 degrees Fahr.

A clean hot ladle is used. The hotter the iron is tapped and poured, the better will be the structure of the metal in the casting. Hot iron is also needed for the thin sections. The bottom inlet helps to make it easier to pour hot iron, because of the slow rise of the metal from the bottom of the mold. The fact that the iron is poured on the hot side, explains in part why great care is exercised in coremaking, molding, drying, and coring-up.

These castings clean well due to the care taken with the cores and mold. Here is where a good grade of blacking pays extra dividends. Very few cores are burned-in and core penetration by the metal is negligible. The sand peels from the castings readily and leaves a smooth, clean surface. The fins chip off easily and for an iron for this composition, are noticeably free from a white fracture, even in thin sections.

In the machine shop these heads are surprisingly easy to machine. Machine operators are highly in favor of iron with this characteristic. Castings are free of sand spots and the iron is exceptionally clean. The castings are true to dimensions and a mirror-like finish is obtained on the machined surfaces.

In one case 140 heads were poured on one order. These went through the machine shop and on to engines without a single rejection. Care taken in the foundry with good supervision can produce good castings as compared to allowing each molder and coremaker proceed with the work according to his own judgment, with a consequent accumulation of scrap, delays, and perhaps even canceled orders.

Water-jacketed manifolds as shown in Fig. 2 from 40 inches to 8 feet in length, present great length and very thin sections. Some thought and effort were spent on devising a successful method of producing satisfactory castings. Casting weight ranges from 400 to 1200 pounds depending on the length. Alternate cooling and heating in which they are subjected in service require that every precaution be taken in the foundry to insure production of satisfactory castings.

Great care is taken in ramming, drying, and blacking the cores. The center (*Please turn to page* 83)

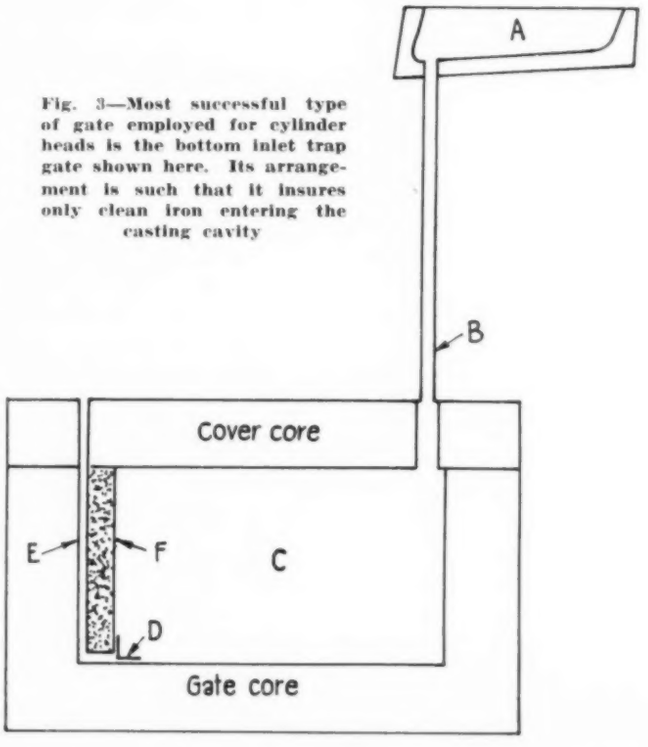
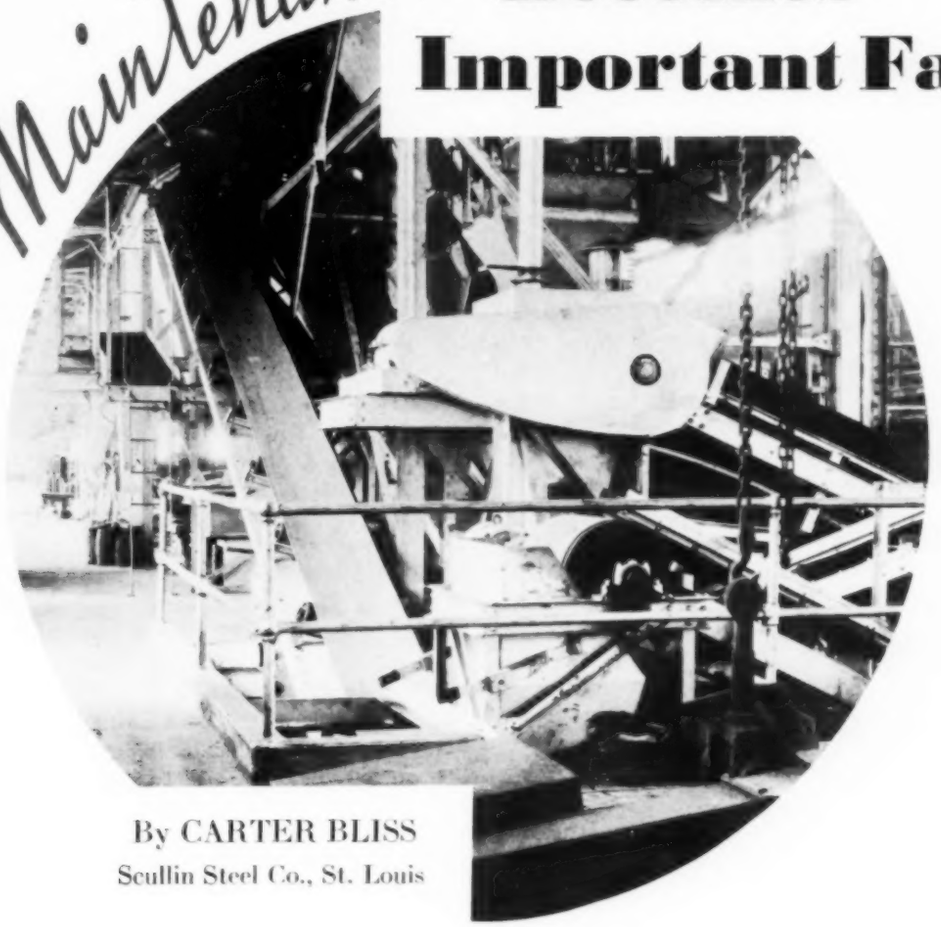


Fig. 3—Most successful type of gate employed for cylinder heads is the bottom inlet trap gate shown here. Its arrangement is such that it insures only clean iron entering the casting cavity

Maintenance Becomes Important Factor



By CARTER BLISS
Scullin Steel Co., St. Louis

This article is abstracted from a paper presented by Carter Bliss, Scullin Steel Co., St. Louis, before the Regional Foundry conference at Rolla, Mo., sponsored by the St. Louis Chapter of the American Foundrymen's association and the Missouri School of Mines and Metallurgy

FOUNDRY methods, patterns, sands and molds have changed little since the art of molding began. Recently methods of making these molds, treating sand before and after the metal is cast, and handling the castings developed rapidly until the maintenance of various mechanical devices has become a problem upon which production and costs depend.

Not many years ago foundry methods relied almost entirely on hand work. If a molder broke a shovel he was given a new one at the store room. Present demand for high speed production has built up far more complicated problems.

With foundry machinery in our plant, as in many others, operating under trying conditions 24 hours per day, lubrication becomes a problem. If permitted to mix with grease or oil sand makes an excellent grinding compound and every one knows the ultimate result. Hence, moving parts must be lubricated and at the same time protected to prevent any excessive wear and a high cost of maintenance.

Mechanical handling of sand, molds and castings has created machinery which must be maintained. Operating heads constantly are faced with the danger of a break down which may tie up the shop and severely cripple production. Insurance companies cover plants for periods when production is stopped by fire, storms or other causes. Breakdowns must be regarded in the same light. Money spent on spare parts, extra belts and alternate machines is insurance against costly delays.

Must Consider Maintenance Cost

In an effort to produce castings quickly and at a low cost, perhaps we have gone too mechanical. Perhaps we have placed too many of our eggs in one basket. Undoubtedly there is a happy medium beyond which it is uneconomical to go. It is folly to install machinery to cut costs and then spend the saved money on maintenance.

Fortunately for the foundry, iron and steel are magnetic. The electric magnet plays a prominent part in production. Charges are loaded quickly and cheaply with a magnet adequately protected and economical to maintain. Magnetic pulleys play a prominent part in the foundry and save (*Please turn to page* 84)

Malleable Castings Find Wide Application

FROM the malleable iron foundries throughout the United States have come many contributions to the construction of the thousands of miles of highways whose phenomenal growth has been a feature of the past 20 years. During this period, the smooth miles of concrete and asphalt have changed the face of the countryside, created new industries and enlarged old ones.

Safety and construction problems increased with each added mile of roadway and many major safety and construction devices have come from malleable iron foundries.

The highway guard rail may be said to be the outstanding road safety development of recent years. Many a possible serious accident has been turned into a minor one, and many a life has been saved by these sturdy fences. The fences have been improved constantly, from the first undependable wooden type to the modern, firmly anchored, steel cable and band type now in almost general use. The up-to-date safety fence is designed to act as a spring bumper. The car which strikes it is pushed away with a minimum of damage. The steel cables are built to withstand tension as high as 20,000 pounds and are off-set from posts by various devices. One of the latest is illustrated in Fig. 3 at the lower left of the accompanying group.

As in the older types of fences, malleable iron is used in the construction of many vital parts. Turnbuckles, cable splices, and cable ends, shown in Fig. 3, are malleable castings. Fence end anchorages in use today, are of several kinds consisting of malleable sleeves, an anchor rod, and a malleable anchor. The anchor, Fig. 2, which now generally replaces the heavy concrete blocks once used, can be installed readily at any time of the year. Malleable iron gives all these parts great strength and high resistance to corrosion, a combination of qualities essential for parts exposed to severe weather conditions and sudden shock.

Among the recent contributions to the correct building of concrete highways are malleable iron expansion joint supports, one of which is shown in Fig. 4. These supports unite the concrete slabs and carry the load allowing room for expansion and contraction.

Malleable foundries have also devised and produced safety stop signs of varied types, attractive and durable lamp standards, Fig. 8, for city streets, and ornamental and protective bridge railings, Fig. 7. An increasing number of drainage scuppers or drain gate frames shown in Fig. 1, are being installed on bridges and culverts.

Fig. 1 (Left)—Drainage scuppers. Fig. 2 (Below)—Cable anchors. Fig. 3 (Bottom)—Steel cable highway fence showing various malleable castings used. Fig. 4 (Right)—Concrete highway expansion joint support. Figs. 5 and 6 (Right center)—Sheave and turnbuckle. Fig. 7 (Bottom right)—Bridge railing. Fig. 8 (Top right)—Lamp standards

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Secretary-Treasurer

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Commissioner

N. F. A. Considers Questions of Management

MANAGEMENT problems, as they pertain to employer-employe relationships, were approached from several interesting angles at the forty-first annual convention of the National Founders association, held in the Waldorf-Astoria hotel, New York Nov. 17 and 18. The meeting was exceptionally well attended with members present from all sections of the country.

Speaking on "Industrial Panaceas; Let Us Look at Some of Them," Franklin R. Hoadley, president of the association, appealed for fair play for industry and recognition by the federal government of business principles which have proved sound for many years.

"It is clear," Mr. Hoadley stated, "that the true economic and practical basis on which to base effectual co-operation between employe and employer is not, as stated by present laws with the employe, but also with management, which has the more complete understanding of problems involving not only wages and working conditions, but also pricing, markets, financing and economic conditions."

In combating fallacious policies proposed by those with little real insight into economic problems, he stated that the job of management was to lay the true facts before the public. "This does not mean propaganda—it means the wide spread dissemination of hard-headed facts, the news of accomplishments of which all industry can be proud. If this job is done effectively the vast majority outside of management will be able to reason clearly, to meet with straight forward answers the hue and cry of those who attempt to lead in the fog and ultimate disaster."

Discussing union leaders frequent demands for "a fair distribution of a national income" with the implication, labor is getting a smaller share than it is entitled to, he cited figures which showed that the percentage of national income going to labor increased from 38 per cent in 1850 to 65 per cent in 1929, to 66.5 per cent in 1936. This steady increase, he said, has not been the result of any class struggle with labor alined against all economic groups. Mr. Hoadley believes that the only opportunity to increase labor shares still further is to increase production so that products may be marketed at prices which will attract buyers and thereby assure steady employment, adequate corporate earnings and corresponding high wages.

Price control has failed everytime it has been tried, not only in the present time but throughout all recorded history. Production control likewise has failed, the speaker declared, citing various instances.

"The test of economic planning is that it will not serve the purposes of the free people, and we in America are still free and intend to remain so," he asserted. "Economic planning must fall of its own weight because it lacks elasticity to meet changing conditions in an ever changing economic world. Any long time plan would of necessity be predicated on only one thing, regimentation through political coercion of every citizen in the country."

Profit control is probably the most complex problem faced by management because its arteries thread back through all factors which make or forestall profits. Previous losses must be averaged; capital attracted; surpluses acquired; plant improvement and expansion anticipated and provision made for obsoles-

cence and depreciation. These and other items he continued all must share with wages in the sales dollar and at the end there must be left an adequate part of that dollar for profit, which he described as the main spring of any enterprise.

If one thought were stressed more than another at the opening sessions it was the importance of management and industry getting their story to the public and presenting it in a sound and logical manner. It was emphasized again by John G. Gall, counsel, National Association of Manufacturers, who discussed certain aspects of pending federal legislation, with particular reference to the wage-hour bill.

He warned that only through a more complete understanding by the public at large of the implications involved in certain pending bills will the defeat of these measures become assured. In the case of the wage-hour bill, he said, all too many, even among manufacturers themselves, apparently can see only certain points which they think may prove advantageous to themselves and their respective communities. The speaker said they seem to forget that they will have to give considerably in exchange and that in fact, in the long run they will lose.

May Result in Heavy Burdens

"If people believe that the federal government should undertake to right competitive differentials, they are in for a licking," he added.

He pointed out that there are more than a few aspects to trade differentials. Not only are there regional differentials, but differentials as between large and small companies, as between freight rates and differentials between foreign and domestic sellers among others.

Mr. Gall added that it might be well for the federal government to take steps for the protection of domestic labor against competition of much lower paid labor abroad before attempting to adjust the various competitive differentials in this country.

Many, he believes, do not realize how much the wage-hour bill encompasses. Some are of the opinion that it would affect only the large units or, at most those engaged in interstate commerce. The speaker said it would go much further than that. They have only to reflect upon the extremes to which various governmental agencies have gone in administrating NRA and other similar pieces of legislation, he said. Moreover, the law seldom ends with the original as passed. There will be amendments in all likelihood, which will carry on to further extremes with resulting heavy burdens.

Commissioner A. E. McClintock, who has just rounded out 40 consecutive years of service with the organization, reported there is still a general shortage of skilled help in the industry. He urged all member companies to keep up with activities in the training of foremen and apprentices. Mr. McClintock also referred to the new book "Elementary Foundry Technology," sponsored by the association.

Member companies, he said, have not been affected as much by labor disturbances during the past year as certain other industries—in fact, considering the general labor unrest that has prevailed, strikes at plants of association members have been relatively few. Never before in the history of the organization, however, have there been greater demands upon the association for counsel in labor relations matters, particularly with respect to interpretation of labor laws, he said.

Speaking on "Forging An Alliance Between Industry and Agriculture," Carl B. Fritsche, managing director, Farm Chermurgie council Dearborn, Mich., explained the work being done to find employment for 50,000,000 idle acres during the next 10 years through turning farm surpluses into industrial uses.

That organization believes that through converting the products of agriculture into usable goods, other than foods, by the application of applied science, the farm population will become better customers of industry. Mr. Fritsche spoke of the work that is being done in the south in developing a domestic paper supply, of the great studies which have been made in the application of the soya bean to industrial uses and pointed to the progress in plastics

Lawrence Dennis, economist, E. A. Pierce & Co., New York, urged the formulation of an educational campaign in checking a trend which carries the increasing aspects of class struggle. He believes that management should demonstrate it can give labor more than it could get by seeking domination, through political or other means; emphasizing that labor's best interest lies in co-operation with management and ownership.

Co-operation Should Be Promoted

He traced the growth of the present movement of labor, in its bid for power, stating that while based on principles of Karl Marx, it did not begin to gain headway here until possibly 10 years ago. The movement he believed has been considerably abetted by influence from certain quarters in Washington.

He thought, however, that the present danger does not lie in the fact that labor will actually capture the power it seeks; rather it lies in the lack of co-operation between labor and industry, a situation that is already affecting business. Promoting this co-operation is the problem which management will have to solve, and in his opinion it can be solved by the education of the general public.

The steady and exceptional increase in the price of labor since 1933 is the most striking feature of recent labor history, according to Lee Wolman, professor of economics, Columbia university, a former NRA official and generally considered one of the early corps of university advisers to the administration.

This rise in wages, while general, appears to have been greatest in manufacturing industry. Prof. Wolman declaring the hourly rate of wages in manufacturing increased by 57 per cent from June, 1933, to August, 1937. Exceeding the peak boom of 1920 and the wage rates operative in 1929, the present level of wages for factory labor are the highest yet recorded. He said:

"The rate of wages has risen much faster than the cost of living, with the (*Please turn to page* 80)

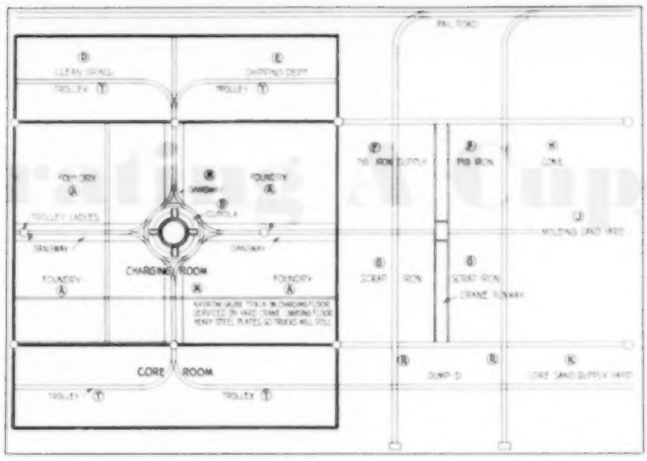


Fig. 1—Layout for a foundry to give economical handling of materials and production

FLOOR plan of a foundry layout believed by the writer to be good for economical handling of materials and production is shown in Fig. 1. A railroad siding running in the raw materials yard is shown at *RR*. Pig iron, scrap, flux, coke and sand can be unloaded directly from the cars and placed in the various stations shown. Pig iron at *F*, coke at *H*, molding sand at *J* scrap iron at *G*, core sand at *K*. Burned sand and other rubbish is taken out of the shop and dumped at *D* for loading into outgoing cars. The foundry proper is spanned by a traveling crane that covers the charging floor and the supply yard. The crane is used for unloading incoming cars and for lifting materials to the charging floor.

Gangways on the foundry floor cross in the center and extend from the cupola in four directions. The cupola is placed in the center of the foundry and the charging floor extends from side to side with no obstructing posts. This arrangement insures a supply of hot metal to all floors. The foundry is serviced by a trolley system extending to all floors, core room, cleaning room, etc. Metal from the four spouts is taken from the cupola in trolley ladles rolling on flanged wheels and operated either by hand or by motor. The core room *C* is located directly adjacent to the foundry. The cleaning room is at the opposite side of the foundry and is serviced by trolley or electric lift trucks. Either truck or trolley may be employed to carry the castings from the cleaning room to the shipping department.

Steel plates on the charging floor allow rolling cars off the rails, if the metal is handled in this manner, or, the metal can be charged directly into the cupola by magnet attached to the crane, or by any of the other mechanical methods now available.

This foundry is based on the productive capacity of about 80 molders. Castings to weigh from a few ounces to not over 200 pounds and average productive capacity of each molder about 1000 pounds, or a total weight of 80,000 pounds. This means the installation of a cupola capable of melting approximately 88,000 pounds per day in the shortest possible time and in as economical manner as possible. Under ordinary conditions the molders work from 7 a.m., to 2 p.m. with a half hour off for lunch, a productive period of 6½ hours or 153.3 pounds per man per hour. Hence it is necessary to provide a cupola that will melt all the iron required in 1½ hours. A cupola lined to 84 inches has a melting capacity of 26 tons per hour, and since the shop ordinarily will not be filled to peak capacity, this size cupola will be ample.

According to generally accepted practice it is necessary to force 30,000 cubic feet of air into the cupola to melt 1 ton of iron, or 15 cubic feet per pound of iron. Assuming that the coke to iron ratio is 1 to 10 it is apparent that 150 cubic feet of air are required for each pound of coke. Experience has shown that attempts to increase this melting rate is unsatisfactory. The air pressure may vary between 8 and 16 ounces, and the air should enter the cupola in sufficient volume and at as low a pressure as is consistent with good operating practice. Air under high pressure is detrimental to the production of good iron and also hastens the destruction of the cupola lining. High pressure air produces oxidized or burned iron with resulting gas pockets and blowholes in the castings.

Increasing or decreasing the speed of the blower will change the melting rate without affecting the pressure. The volume of air should be sufficient to establish the zone of highest temperature about 18 inches above the tuyeres. Regulating the air volume to conform with this rule is one of the most important features in melting iron in the cupola.

Under ideal combustion conditions the carbon in the fuel unites with the oxygen of the air to form carbon dioxide. A pound of carbon burned in this manner produces 14,500 B.t.u.'s. Where air is not present in sufficient quantity to burn completely the carbon in the coke, carbon monoxide is formed with a development of 4400 heat units per pound of carbon. Combination of carbon and oxygen from the blast and fuel produces carbon dioxide at a point not far above the tuyeres. This gas in passing up through the fuel takes up more carbon and is converted to carbon monoxide. To operate (*Please turn to page* 86)

Melting Rate and Air Volume

Cupola lining diam.	Melting ratio tons per hour	Volume of air Cu. Ft. per hour	Volume of air Cu. Ft. per min.
18	.6	18,000	300
24	1.0	30,000	500
30	3.0	90,000	1,500
36	5.0	150,000	2,500
42	6.5	195,000	3,250
48	8.0	240,000	4,000
54	10.0	300,000	5,000
60	13.0	390,000	6,500
66	16.0	480,000	8,000
72	19.0	570,000	9,500
78	22.0	660,000	11,000
84	26.0	780,000	13,000
90	30.0	900,000	15,000

QUESTIONS and ANSWERS

This department includes problems relating to metallurgical, melting and molding practice encountered in making castings. Questions from subscribers addressed to the Editor of The Foundry will be answered by members of the editorial staff, supplemented where occasion requires by the advisory staff.

Shrinkage Causes Trouble in Aluminum Fuel Tanks

We are sending one fuel tank which is supposed to hold kerosene. Marks designated on casting with pencil, we think are shrinks. We have tried using chills in the core and on the outside in the heavy sections, and do not seem to have success in this manner. We seem to drive the shrink from one place to the other. It is impossible to put risers or shrink bosses on the ends where the heavy lugs are on account of the parting which comes down below the lugs. Pouring temperature is 1350 degrees Fahr., using regular commercial No. 12 aluminum alloy with about 1 per cent silicon.

Examination of the casting forwarded to us for inspection, at the points indicated, leads us to the same opinion you entertain. That is, that those points are shrinks, resulting from improper feeding of the casting. Naturally, the only way that the trouble can be corrected is by the proper feeding or through the proper application of chills.

Presumably you have some definite reasons for molding it in its present position, but it occurs to us that if the position could be reversed, risers could be placed over the points which now are causing trouble. You mention that you have tried using chills to remedy the difficulty, but we wonder if you are following the correct procedure. For example, it appears that two chills were used in the cope over the bosses at the sprue or gate end. To obtain the desired result the chills should be placed in the drag. Your present methods tends to cut off the supply of metal to the boss, rather than to promote progressive cooling in the heavy section.

Incidentally, we cannot see any reason why risers going straight up through the cope cannot be placed over the bosses at both ends. Instead of using two gates along the sides, we suggest that a large number of gates be employed along the sides like finger gates. We suggest gates about 1-inch wide and ⅛-inch thick spaced about 1-inch apart. That will give you about 5 gates on each side. Also we suggest that two similar gates be placed at the end where the sprue is placed. We do not believe your present shrink bobs are of much use and that they either be eliminated or increased considerably in height.

Sand Sticking May Be Caused By Composition of Metal

We are using No. 1 Albany molding sand and we find in pouring red and yellow brass castings that the sand seems to stick a great deal to the castings when they are taken out. In your opinion what does this denote. Is the sand weak or strong or is there much clay in it?

No. 1 Albany sand is rather coarse for brass and bronze castings, but it is used quite commonly. Numbers 0 and 00 more frequently are used as they tend to give a better finish. The sticking of the sand to the casting is caused in part by the temperature at which the metal is poured and may be caused by the presence of some elements in the metal mixture which tends to cut or react with the bond or clay in the sand. Phosphorus, for example, will cause this to take place. Some metals high in lead will cut the sand more than those with lower lead content, particularly where the castings are fairly heavy or have heavy risers attached, thus increasing the hydrostatic pressure on the sand particles.

It is difficult to state whether the bond or clay is abnormally high or low without a careful examination of the sand, but Albany sand as such, when it has had mixed with it some old or burnt sand as generally is found in sand heaps, shows a satisfactory proportion of bond.

Reports of the molding sand committees of the American Foundrymen's association have given careful detailed information about the amount of bond and moisture desirable, the way to determine relative proportions of any given sand and other valuable points. If you do not have these reports on hand, we would suggest that you secure them from the A. F. A. and benefit from the work covered by those committees so thoroughly.

Avoid Core Burning in Through Temperature Control

Our problem is one wherein the core burns in or fuses within the casting. For example, we have made several large castings that run from 7000 to 10,000 pounds in weight. The outside diameter varies from 30 to 45 inches and the core from 10 to 14 inches. The alloy used was 86 per cent copper, 11 per cent tin, 2 per cent nickel, 0.25 per cent phosphor, impurities including lead, 0.75 per cent. After casting, we found that the core always fused to a point about 20 inches from the bottom. We had quite a time knocking this out. We have considered using graphite in the bottom and also of using sheet asbestos around the core and coating the same. We would like to have your suggestions as to how to overcome this difficulty.

Control of the temperature at which the metal is poured is one of the important factors in avoiding the burning-in or fusing of the cores to the castings on such a heavy walled casting as you describe. Since the casting wall is relatively thick and there is no danger of mis-runs, pouring as cold as conditions will permit will materially reduce your problem. However, since your alloy contains an appreciable percentage of nickel, necessarily the pouring temperature is higher than would be the case if it were the usual phosphor bronze alloy without nickel.

The core should be coated thoroughly and one very satisfactory medium is to paint it with a solution of thin grout made up of Portland cement and water in such a proportion as will make a creamy paint to be spread on with a brush. The thicker the solution is the less it will penetrate the core, and consequently the less danger you will have from blowing. After the cement coating has hardened, it is well to rub the surface with a paste made up of a good grade of graphite mixed with a bond. Many foundrymen use as a bond for that paste, some of the high temperautre cements that are commonly used for cementing the fire brick together in lining their furnaces.

Obviously this will make a surface on the core through which gases will find difficulty in passing. Consequently, any gases that must be released from the mold must be given opportunity to leave the mold by other exists. However, if your casting is poured at the right temperature so that gases as produced may bubble up through the metal and pass out freely through vents in the mold and up through the higher passages, you should have little difficulty in spite of using a relatively impervious coating on the core.

We believe you might have trouble in using an asbestos sheet to cover the core as the gases released upon subjecting this sheet to the high temperature, might not find the necessary exists and thus be held within the mold and cause blow holes to appear in the casting. Good practice in the production of this class of work has demonstrated the value of a hard core to withstand the heavy hydrostatic pressure and then resist the penetration by the hot liquid metal.

The pores of the cores will also resist this penetration if they are well filled with a heat resisting material like fire clay or graphite, or a combination of both. In some steel foundries where temperatures are even higher than in your case, and where they have to contend frequently with similarly heavy-walled thicknesses, the cores are bonded with Portland cement and are as hard as a piece of concrete.

They are, however, designed so that the concrete wall is just thick enough to withstand the strains and inside of that wall the core is filled with a free venting material like gravel, broken stones or coke. These cores are surfaced with a refractory coating and have been subjected to a sufficient amount of heat before being used to drive off as thoroughly as possible all the water in the bonding material so that a minimum amount of steam will be developed when the core comes in contact with the heated metal.

Such cores may give satisfactory service in such heavy castings as you describe, particularly where you have an alloy that has to be poured at the elevated temperature demanded for an alloy containing an appreciable amount of nickel. There is one thing in your favor which should be noted and that is, the shrinkage requirements of your particular alloy do not require the heavy risers that would be demanded were you pouring aluminum bronze or manganese bronze; therefore, your liquid pressure is not quite as high per square inch as in the case of these alloys.

Shrinkage Holes in Casting Result From the Cores

We are making a tapered pulley 15½-inches diameter at one end, 17-inches diameter at the other end, 10½ inches high with a metal thickness in the rough 1½ inches. When grooves are machined on the face we find holes at the bottom. Analysis of the iron is satisfactory. We are enclosing samples of the borings for your attention.

Unfortuniately the borings do not furnish any clue to the cause of the holes in the casting. The borings represent a nice soft grade of gray iron and that is all. From the data submitted we are inclined to the opinion that the holes found in the casting are a combination of shrinkage and gas holes caused by the cores—presumably dry sand—which form the inside part of the mold. Gas from these cores enters the metal in the vertical wall of the casting and cause the metal to cool rapidly in the vicinity. Later these cooled areas do not permit the remainder of the metal to settle in a solid mass as it would under proper conditions.

The obvious remedy is to provide a mold and core in which the metal will lie quietly while in a molten condition and then shrink in a normal manner. Whether the sand on the inside of the casting is green or dry, it should be extremely permeable and provision should be made for the generated gas or steam to escape readily. The mold should be rammed firmly on the outside to prevent straining. The metal may be introduced through gates either on the hub or on the rim and three feeding risers, each 3 inches in diameter, at least 6 inches high should be spaced equidistantly on top of the rim.

Add Some Coal Dust To Facing

Our pistons made with green sand cores are rough and dirty on the inside and the sand is burned badly on the gate side. We have to tumble them twice, because the sand shows up worse on the castings after they are heat treated. The metal is poured at a temperature between 2760 and 2810 degrees Fahr. Green sand for the cores is made up of 2 parts heap sand, 1 part sharp sand and a small amount of bentonite. Permeability is between 65 and 70, green strength 5 to 6 pounds and moisture between 2.7 and 3 per cent.

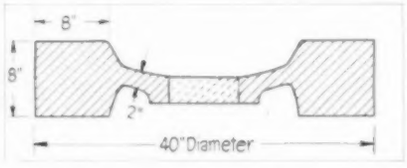
The characteristics of the sand you are using correspond closely to those of the sand employed satisfactorily by a prominent manufacturer of automobile pistons with the single exception that you do not include any coal dust. Possibly your heap sand is not sufficiently refractory to withstand metal poured at a high temperature. This is a point that only may be determined by experiment with other grades of sand. However, it may be that a small addition of coal dust is all that is required to produce a clean skin on the castings. For your castings with exceedingly thin walls the addition of 1 part coal dust to 10 or 12 parts sand should be sufficient.

Cope Face Dirty on Balance wheel

We have diesel engine balance wheels about 40 inches diameter and weighing approximately 1 ton to make. We never have made castings of this weight and will appreciate your comment on our proposed program. We shall mix a little pitch binder with the facing sand and dry the mold with an oil torch. The wheel will be fed through four 8-inch diameter risers. Iron in the ladle will be cooled down as much as possible before it is poured into the mold. Pouring will stop when the iron appears in the bottom of the risers. The risers then will be filled with hot iron from the cupola and kept filled as long as they remain open.

The method you outline for making the balance wheel mold will produce a satisfactory casting if the mold is formed in a strong grade of sand rammed in an iron flask. If no iron flask is available the pattern can be bedded in the floor. However, from your letter we get the general impression that you specialize in small castings, therefore you probably have no suitable floor for this practice, nor any molder familiar with the procedure. If you are forced to use a wood flask it must be strongly built and braced with two long bolts extending at right angles to each other across the center and about 1 inch away from the pattern.

A great deal of shrinkage trouble can be traced to a weak flask. The weight and pressure of the metal causes the mold to yield after it is filled, with a consequent sinking of the metal on top of the casting. Since you specialize in small castings it is quite probable that you use a fine grade of sand. This is not suitable for thick, heavy castings. It will buckle and scab and



Section of flywheel casting 40 inches in diameter with rim 8 inches thick

draw down on the cope side. You probably will have to *doctor* it by the addition of a few shovels of sharp sand to your facing. The pitch binder to which you refer strengthens the sand and enables the face of the mold to acquire a hard crust when it is dried with the torch. Further precautionary measures to observe with fine sand on a heavy casting include a coke bed in the drag and liberal use of the vent wire not only on the bottom and top but also around the rim. With a coarse, open grade of sand, none of these precautions are necessary.

Vanes Are Formed By Sand Cores

I have several motor cycle cylinder blocks to make on which the cooling vanes are 1¼-inch deep. Can you tell me if these vanes are cut on a machine, or, are they cast in place. If they are cast, how is the work done.

Vanes on motor cycle cylinder blocks and on many other more or less similar types of castings are formed in the mold with the remainder of the casting. The mold is made from a core sand mixture and the resulting cores are dried in the oven. The mold may be made in a snap flask, or in an ordinary two-part flask, but usually where these castings are made in large numbers, the two half patterns are mounted in the bottom of two core boxes. The half cores are rammed, rolled over on a plate and the corebox is removed. Suitable small depressions on one core and corresponding projections on the other core serve to locate the two halves later in proper relation to each other.

The corebox is mounted on a roll over pattern draw machine on which the core is lowered away from the pattern. Obviously a particularly well made pattern is required to insure a clean and accurate draw. The core sand also must be sufficiently permeable for the gas to escape from the thin bodies of sand between the vanes. Pieces of wire or long, thin nails are placed in the sand at certain points in the vanes where a little extra reinforcement is required. Making these cores is a tricky job. Considerable experience is required in developing a satisfactory sand mixture that will stand up while green, draw from between the vanes, and vent freely.

Time Is Needed To Prepare Cupola

We use all scrap charges on a daily heat of 10 tons in a cupola lined to 42 inches. How many hours should the cupola man require to chip down and patch the lining, repair the cupola spout and the lining in two 1400-pound ladles. What time is required for the helper to remove the drop. Starting at 7 a.m. what time should the cupola be ready for charging.

The time required for preparing a cupola for the daily heat depends on several factors, including the condition of the interior following the previous day's heat. A cupola that melts fast and hot and drops clean, will require a great deal less repair than one in which the melting is slow and cold with a consequent heavy bridge. In your particular case with a heat running approximately 2 hours after the wind goes on, you should have a clean drop and not more than 4 or 5 inches of bridge if the cupola is slagged properly.

Under ordinary conditions this bridge can be chipped away and a new layer of daubing applied to the lining in about 2 hours. With the amount of the charge calculated nicely, little or no iron will appear in the drop and the amount of coke will not exceed a few barrow loads. The time required to remove this material will depend to some extent on the distance it has to be carried. Ordinarily the helper can remove the slag and burned coke and riddle the sand for the bottom in about an hour. He then either takes kindling wood up to the charging floor, or commences to get his supply of coke ready for the day. He gives the melter a hand in putting up the doors and preparing the bottom. Usually the cupola is ready for lighting about 11 a.m. if necessary.

Auto Springs in Cupola Charge

We have a quantity of automobile springs which we want to incorporate in the cupola charges. These springs are from the older model machines and according to published information contain silicon 2.00 per cent and manganese 0.60 to 0.80 per cent. We understand that the later springs contain chromium up to 1.00 per cent and small amounts of vanadium. We shall appreciate an expression of opinion on this subject.

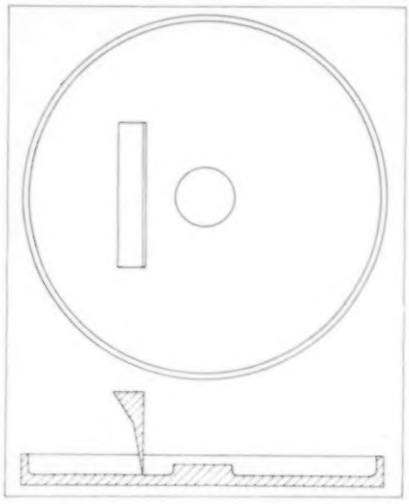
Unless used in very small amounts, or unless your castings are not held to close specifications in chemical and physical properties, the use of automobile springs in the cupola mixture may cause trouble. Automobile manufacturers constantly are experimenting with different materials and it is easily possible that out of a miscellaneous pile of springs you might not find two of exactly the same analysis. The standard SAE specification for leaf springs is the silico-manganese steel containing carbon 0.50 to 0.60 per cent, silicon 1.80 to 2.20 per cent, manganese 0.60 to 0.90 per cent, sulphur maximum 0.05 per cent and phosphorus maximum 0.04 per cent.

However, almost every manufacturer at one time or another has varied this composition by the addition of various amounts of chromium, vanadium and molybdenum. The addition of chromium up to 1.00 per cent is by no means a modern innovation. The plain carbon steels and the silico-manganese steels may be used freely as part of the cupola charge, but the chromium bearing steels must be used with discretion and with a full knowledge of the hardening effect of this element on the resulting iron. If you are familiar with the spark test, where a piece of the material is held against a grinding wheel and the character of the sparks noted, you readily can sort the material into marked piles. Whether the extra work involved in this operation is compensated by the difference in price between this class of scrap and another is another question depending principally on local conditions.

Steam Causes Rough Casting Surface

We are forwarding for your inspection a 10-inch diameter base casting, a plain flat plate with a circumferential rim $\frac{5}{8}$-inch high on one side. We are at a loss to account for several rough areas on the surface.

Roughness on the casting is caused by a slight amount of scum floating on the iron. The scum in turn is produced by steam from the sand bubbling through the metal in the mold. In this particular instance we are inclined to the opinion that a *tight* bottom board prevents the ready escape of steam from the drag. One remedy is to provide vent passages between the drag and bottom board. Another, and this is preferable, is to mold



Suggested change in position of casting and type of gate

the casting with the rim in the cope. The present gating method, two thin gates on the rim could be continued, but a better method would be to pour the casting through a single wedge or knife gate on top as shown in the accompanying illustration.

Desires to Reclaim Used Core Sand

We should like to reclaim some of our core sand. We shall appreciate your opinion on the feasibility of this idea, and the methods and equipment necessary.

Under certain conditions and for certain types of cores varying amounts of used core sand may be incorporated in the mixture. In some instances the given amount of core scrap is thrown into a muller type mixer with the other ingredients. In others the broken pieces of cores are loaded in a tumbling barrel with iron balls, bars, or just a miscellaneous collection of iron scrap and broken down in that manner. This sand then is added to the core sand mixture.

However, your attention is directed to the fact that the binding agent in a core is changed during the baking process and in addition, a certain amount of the binder is carbonized. For this reason a greater amount of binder is required in a batch of old sand, than would be required for an equal amount of new sand. Also, the sand in that part of the core in immediate contact with the casting is broken down to some extent, thus increasing the volume of fines in the mixture where this material is introduced. The net result is a lowering of the permeability. Briefly, where maximum permeability is required in a core, old sand cannot be employed in the mixture.

Brass Castings Are Not Clean

We have installed a brass foundry with our gray iron foundry and we do not know just how to clean our brass castings to get that nice, smooth reddish appearance they should have. We have tumbled them in tumblers which we use for gray iron, and also tried sandblasting but those processes do not seem to be successful. Can you tell us what the procedure is?

Since you did not include very much information in your question, it is difficult to give a definite answer. You refer to color and to surface so we cannot decide whether you have one or two problems. We note that you mentioned installing the brass foundry in connection with your present gray iron foundry, and we wonder if you have the two departments arranged so that there is no possibility of the sands of the two becoming mixed. That is to say, some of the sand from the iron foundry getting into that used for brass. If that is the case, we believe that the iron sand may tend to produce a much darker color due to the presence of iron. Then too, there is the ever-present danger of tramp iron, shot, etc. contaminating your brass mixtures.

If you are troubled with rough surfaces perhaps your sand is not fine enough, and you will have to purchase the proper kind of sand which is suitable for the size of the castings you are making. If you want brass castings with a reddish color, you must have sufficient copper in the alloy to produce that color because if any considerable quantity of zinc is present, the color tends toward yellow. Usually if the copper content gets much below 77 per cent, the alloy is more yellow than red. Castings sometimes are colored by giving them an acid dip in a solution comprised of two parts of nitric acid to which has been added 1 part of sulphuric acid. Considerable care must be taken in mixing and handling and using the dip because it will cause severe burns. In mixing the sulphuric acid should be added slowly in the cold, to the nitric acid with constant stirring. After dipping the castings in the solution for a few seconds, they are immediately rinsed in cold water.

MARTIN J. LEFLER

CALVIN P. WOLFE

WITOLD W. KOSICKI

A. S. COFFINBERRY

MEN of INDUSTRY

MARTIN J. LEFLER, formerly general superintendent, Western Foundry Co., Chicago, has been appointed general foundry superintendent, Oliver Farm Equipment Co., Chicago. Mr. Lefler graduated from Michigan State college, East Lansing, Mich. He then started work as a laborer at Deere & Co. and advanced in several stages to the position of foundry superintendent of their malleable plant at East Moline, Ill. Mr. Lefler also acted as assistant foundry superintendent of the J. I. Case Threshing Machine Co., Racine, Wis. for 3 years. He had been connected with the Oliver Farm Equipment Co. for 6 years prior to his association with the Western organization the early part of the year. Mr. Lefler's headquarters will be at the South Bend, Ind. plant of the Oliver Farm Equipment Co.

♦ ♦ ♦

CALVIN P. WOLFE recently was appointed foundry superintendent, Ebco Mfg. Co., Columbus, O. Mr. Wolfe formerly was superintendent, Miller Foundry Co., Columbus. He began his apprenticeship in a small foundry in Union Springs, N. Y. in 1899, and later worked 8 years as a journeyman molder for the McIntosh-Seymour Co., Auburn, N. Y. In 1910 he was made foundry foreman of the Enterprise Foundry Co., Auburn and in 1912 accepted the position of foundry superintendent, Johnston Harvester Co., now the Massey-Harris Co., Batavia, N. Y. In 1916 he was appointed general superintendent of the L. J. Mueller Furnace Co., Milwaukee, and held that position for a number of years. In 1936 he became connected with the Miller Foundry Co. in Columbus, O.

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WITOLD WATHA KOSICKI, for the past 17 years metallurgist, J. T. Wing & Co., Detroit, has established his own nonferrous foundry under the name of the Metalloy Products Co., Detroit. Mr. Kosicki was born in Kumary, Poland in 1884 and after completing his preparatory training he entered the Polytechnic institute, Kiev, Russia, and in 1912 received his mechanical engineering degree. He later entered the Mining institute, Petrograd, Russia, in preparation for an assistant professorship in metallurgy.

However, the World War interrupted his education and he became a munitions inspector for the Russian artillery commission. In 1916 he was sent to the United States in the same capacity, and in 1918 resigned to enter the Massachusetts Institute of Technology, Cambridge, Mass., where in 1920 he received his master of science degree. Mr. Kosicki was in the testing department, Anaconda Copper Mining Co., and in 1920 became metallurgist of J. T. Wing & Co. in charge of the white metal bearings department. Later he added smelting and refining and a brass, bronze and aluminum foundry. Mr. Kosicki organized the Polish Engineering society, Detroit, and also the Polish Engineering society, Chicago. He is a member of the American Foundrymen's association, the Engineering society, Detroit, and the Technical Society of Warsaw, Poland.

♦ ♦ ♦

ARTHUR S. COFFINBERRY has returned to the teaching staff of Case School of Applied Science, Cleveland to teach physical metallurgy in the field of instruction left vacant by the recent resignation of Dr. A. Allan Bates. Mr. Coffinberry was born in Lakewod, O., and attended the public schools of that city. He received a degree of bachelor of engineering physics from Ohio State university in 1932 and a master of science in mineralogy from that school in 1934. While working toward the latter degree he held a special research fellowship with the AC Spark Plug Co. and devoted a portion of the time to a study of electrical porcelains in the Flint, Mich. plant. He was appointed to the teaching staff of Case during the summer term of 1935 when he substituted as an instructor in geology and petrography. During the intervening 2 years he has held an assistantship in x-ray metallography at Harvard university, where he obtained his doctor of science degree from the department of metallurgy in June, 1937.

(*Continued on page* 44)

Testing Truline Binder Cores for Permeability

Cores made with Truline Binder* are strong but permeable. This means that they stand up under handling and storage but when the metal is poured the binder burns out, causing the sand to collapse and thus eliminating blow holes. This property is valuable particularly in high shrinkage castings where a slow-burning, dense, rigid core would cause the metal to crack.

The illustration shows a Truline Binder core being tested in Hercules Experiment Station's fully equipped core laboratory.

Write for a sample of this powdered dry binder and prices. It is used wherever metals are cast.

*Reg. U. S. Pat. Off. by Hercules Powder Company

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Branch Offices
Chicago
New York
St. Louis
Salt Lake City
San Francisco

JJ-13

(*Continued from page* 42)

JOHN HOWE HALL, consulting engineer on steel foundry practice, has established headquarters at 6802 Lincoln Drive, Germantown, Philadelphia, Pa.

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R. J. REED, associated with the Titusville Iron Works division, Struthers-Wells-Titusville Corp., Titusville, Pa., for more than 10 years has been named manager of that

R. J. Reed

division. Mr. Reed has been succeeded in his previous position of sales manager by DOUGLAS E. PENNING.

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HAROLD L. HOEFMAN has been appointed manager of the Link-Belt plant, warehouse and sales office at Atlanta, Ga., to succeed Mr. I. H. Barbee, who died on Nov. 4. Mr. Hoefman brings a wide experience to his now position, having started with the company 17 years ago as a draftsman in the Pershing road, Chicago plant engineering department. After working in several divisions of this department, he was transferred to the sales department, serving first as sales engineer at the Chicago office, then at Kansas City; Dallas; and Indianapolis. Since 1935 he has been manager of the Link-Belt warehouse and sales office in Detroit.

GEORGE A. PAIGE has been appointed manager of the Link-Belt warehouse and sales office in Detroit. Mr. Paige also started his Link-Belt career in the Chicago plant engineering department 17 years ago. Three years later he was transferred to the sales department, serving first at the Chicago office. In 1926 he was given the position of sales engineer in Detroit territory. Since last year he has been district sales manager at Pittsburgh.

LAURENCE O. MILLARD has been appointed district sales manager at Pittsburgh, Mr. Millard joined the Chicago plant engineering department in 1913, and was transferred to the Cleveland office as sales engineer in 1923. In 1929 he returned to the Chicago plant as a specialist in power plant coal and ashes handling machinery sales. Since 1933 he has been district sales manager at Cleveland.

PAUL V. WHEELER has been appointed district sales manager at Cleveland. He started his Link-Belt career at the company's Pittsburgh office in 1907, first handling general merchandise sales, and then specializing on positive drive applications. Mr. Wheeler became associated with the Cleveland office in 1921, when the office was first opened.

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GLEN H. TRESLAR has been appointed assistant sales manager of the Black & Decker Co., Towson, Md.

♦ ♦ ♦

W. C. FLANDERS recently has been made sales manager, Worthington-Gamon Meter Co., succeeding G. H. Gleason, formerly vice president in charge of sales, who has resigned.

♦ ♦ ♦

GEORGE H. CORLISS recently has been appointed regional manager for the Lewis-Shepard Co., Boston, with headquarters at 1401 Santa Fe Avenue, Los Angeles. Mr. Corliss has been advertising and sales promotion manager of the company for the past 4 years.

♦ ♦ ♦

HUGO KUROWSKE has been made sales manager, Claude B. Schneible Co., Chicago. L. C. BEERS, formerly southern representative, has been made New England district manager with headquarters in Springfield, Mass. CARL HERMAN of Philadelphia will be in charge of sales in New Jersy and New York metropolitan area. NOYES C. FRENCH, Ohio representative with headquarters in Cleveland, has been given additional sales territory including part of West Virginia and Kentucky. JOHN LISKOW has been appointed chief engineer, and CARL NODERER has been made experimental engineer of the company.

♦ ♦ ♦

ARTHUR L. BLAKESLEE, president and general manager, Kalamazoo Stove & Furnace Co., Kalamazoo, was elected mayor of the city of Kalamazoo in the recent election by the largest vote ever cast for that office.

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F. E. RHINE, formerly sales manager, Duncan Foundry & Machine Works Inc., Alton, Ill., has been appointed service manager of the Joy Mfg. Co., Franklin, Pa.

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D. T. DOWNES, chief engineer, Calorizing Co., Wilkinsburg, Pa., has resigned to accept a position as development engineer for Pittsburgh Plate Glass Co. at the recently organized central development laboratory.

♦ ♦ ♦

AUSTIN BOSTICK, associated with the Bostick Foundry Co., Lapeer, Mich., since 1893, retired as president recently. WILLIAM G. VOGEL of Grand Rapids, has been elected president and E. T. WHITE will continue as secretary-treasurer, and general manager.

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PAUL SCHWIETZKE, associated with the firm of J. G. Schwietzke, Metallwerke, Dusseldorf, Germany, has been nominated for the presidency of the International Committee of Foundry Technical associations by the German foundry group. GUIDO VANZETTI, managing director, Fonderia Milanese di Acciaio, Milan, Italy, has been nominated for the vice presidency of that committee by the Italian association.

♦ ♦ ♦

GEORGE O'CONNOR, foundry superintendent of the Chicago foundry of the Link Belt Co. from 1907 to

(*Concluded on page* 46)

Harold L. Hoefman

George A. Paige

Laurance O. Millard

Paul V. Wheeler

OSBORN

CORE BLOWING MACHINES

● Look to the improved and enlarged line of Osborn Core Blowing Machines to meet your particular core blowing requirements.

The new 91-10 model, illustrated, has been developed and added to the Osborn line to meet the need for an intermediate size between the No. 91 and No. 92 machines. The No. 91-10, while retaining the speed and operating tempo of the smaller machine, is available in sand reservoir sizes suitable to accommodate cores of wide, rangy shapes which do not require the volume of sand delivered by the larger machines.

In step with the constant demand of modern foundries for better machines, the entire line of Osborn Core Blowers has been improved and expanded to meet every normal requirement. Complete details will be sent promptly upon request.

THE OSBORN MANUFACTURING COMPANY
5401 HAMILTON AVENUE • CLEVELAND, OHIO, U. S. A.
• Agencies strategically located all over the world •

The New 91-10 Osborn Core Blowing Machine

TIME PROVES VALUES

OSBORN

(*Concluded from page 44*)

1937, and now company consultant on foundry matters, recently was presented a handsome wrist-watch during the dedication of the new Link Belt foundry in Chicago. FRED SKEATES, present foundry superintendent, made the presentation.

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R. P. MORGAN, representative of the Herman Pneumatic Machine Co., Zelienople, Pa., in the New England and Quebec districts has moved his headquarters from Newton, Mass., to 222 Wildbraham road, Springfield, Mass.

♦ ♦ ♦

F. E. KASCH formerly foundry engineer, Whitehead Metal Products Co. Inc., New York, recently has been made metallurgist, Aetna-Standard Engineering Co., Ellwood City, Pa., specializing on the production of chilled iron rolls. Mr. Kasch was assistant metallurgist, International Nickel Co. laboratory, Bayonne, N. J. from 1928 to 1935. He then became connected with the Whitehead company.

♦ ♦ ♦

ROLAND S. HIGGINS has been appointed representative of the Continental Roll & Steel Foundry Co., furnace division, in the middlewestern district with offices at East Chicago, Ind. During the past 15 years Mr. Higgins has been actively engaged in combustion engineering and the sale of combustion and control equipment. He was recently with the Smooth Engineering division of the Republic Flow Meters Co.

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CHARLES E. LUTON, has returned to SPO Inc., Cleveland, as sales manager and vice president. Mr. Luton was connected with the Taylor-Boggis Foundry, Cleveland, for 10 years, and for three years was foundry superintendent. He then was sales engineer, SPO Inc. and later became connected with the Jeffrey Mfg. Co., Columbus, O., as sales engineer in the foundry division.

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ARTHUR MCCAUGHNA has been elected president, General Foundry & Mfg. Co., Flint, Mich., succeeding CARL W. BONBRIGHT who will continue as an executive and director of the company. Mr. McCaughna recently resigned an executive position with the Norge Refrigerator Co.

♦ ♦ ♦

JAMES A. SLATER, vice president in charge of railway sales of the National Malleable & Steel Castings Co., Cleveland, has been elected a director of that organization to fill the vacancy left by the death of Oliver W. Loomis. Mr. Slater first was associated with the National Malleable Castings Co., predecessor company, in 1897 and served in various capacities until 1913 when he went to Chicago as manager of railway sales in that territory. Returning to Cleveland in 1921 and continuing his sales work, Mr. Slater was made assistant vice president in 1931 and vice president in 1934.

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L. W. WALLACE, head of engineering research for the Association of American Railroads, has been made director of the new engineering and research division, Crane Co., Chicago. The new division, composed of existing branches of research and development and the product engineering department, will co-ordinate all engineering activities of the company and direct the development of new products.

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W. J. BACH, 1400 Tenth place, South, Birmingham, Ala., has been appointed representative of the Hammond Machinery Builders, Kalamazoo, Mich. for the sale of grinders for foundry use. Mr. Bach will represent the company in Tennessee, Georgia, Alabama, Florida, Louisiana, North Carolina and South Carolina.

♦ ♦ ♦

H. N. DAVIS, president, Stevens Institute of Technology, Hoboken, N. J., recently was elected president of the American Society of Mechanical Engineers. Vice presidents include following: F. O. HOAGLAND, master mechanic, Pratt & Whitney division of Niles Bement-Pond Co., Hartford, Conn.; B. M. BRIGMAN, dean, Speed Scientific school, University of Louisville, Louisville, Ky.; W. H. MCBRYDE, consulting engineer, San Francisco; HARTE COOKE, mechanical engineer, McIntosh & Seymour Corp., Auburn, N. Y.; and L. W. WALLACE, Crane Co., Chicago.

♦ ♦ ♦

A. B. CRAWFORD has been named manager of railway sales of Continental Roll & Steel Foundry Co., with headquarters in the Pittsburgh office. Mr. Crawford has been active in steel castings sales for many years, first with the Duquesne Steel Foundry Co. and continuing with the Continental company, which was formed in 1930 by a merger of the Duquesne company with Hubbard Steel Foundry Co., East Chicago, Ind., and Wheeling Mold & Foundry Co., Wheeling, W. Va.

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D. D. FENNELL, consulting engineer, Chicago, recently was elected president of the National Safety council. Mr. Fennell was graduated from Hiram college, Hiram, O., and then studied mechanical engineering in Germany and Switzerland. For 9 years following his graduation he specialized in combustion engineering and for the past 20 years has been a consulting engineer in management problems.

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JAMES L. CAWTHON, JR., until recently Pittsburgh district manager of sales, American Steel Foundries, has become affiliated with Continental Roll & Steel Foundry Co. as sales engineer, with headquarters in the company's Pittsburgh office. Prior to joining American Steel Foundries, he had been for many years sales manager of the Bonney-Floyd Co., Columbus, O.

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F. J. WOLDRICH recently has been placed in charge of a new branch sales office of Cutler-Hammer Inc., Milwaukee, at 625 N. W. Everett street, Portland, Oreg. E. T. REES, has been made manager of the Indianapolis office of that company and ELMER F. WEISS has been appointed manager of the Detroit office.

Gray Iron Plant Safety Drive

WHILE it is acknowledged that everyone concerned loses when an accident occurs, men continue to be careless. In the belief that "money talks" and a gambling spirit lurks under the overalls of nearly every man, W. W. Rose, Executive Vice President, Gray Iron Founders' society, is spending some of his own money to find out if this be so.

A contest, extending from Jan. 1, to March 31, is open to all employes of members of the Gray Iron Founders' society engaged in hazardous occupations. Rules will be simple and only require that the employe shall have been on the payroll during that period. An accident will disqualify the individual as well as a failure to observe the plant safety regulations.

Those not disqualified during the contest will then be reported by name or number to the office of the society. Each contestant will receive a key number, the numbers will be well stirred in a receptacle and taken to Washington. An official of national importance, to be announced later, will then draw 14 numbers, one at a time. The first will carry a prize of $50, the second $25, third $10, the fourth $5 and the remaining ten $1 each.

It will be interesting to note what effect this scheme will have on the accident rate of the foundries involved. Should it be outstanding, recommendations will then be made to make this a regular feature of the Gray Iron Founders' society's many activities.

RHYTHMIC TURNINGS

Put an ear to the iron casting being turned on one of today's modern machine tools with its positive feeds . . . If the casting possesses a deep, unwanted chill —the turnings perform some fancy arcs, while the cutting tool quickly loses its efficiency to a chattering tune.

Present day machine shop production demands that grey iron and malleable castings be cast with a controlled chill for easier machinability . . . and No. 8 Mexican Graphite makes this absolutely possible!

Our Bulletins describe the simplicity with which No. 8 Mexican Graphite may be used—plus a host of useful information on chill control. Write for your copies!

THE UNITED STATES GRAPHITE CO.
SAGINAW MICH.

NO. 8 MEXICAN GRAPHITE

Hold Iowa Regional Conference

ATTENDANCE at the second annual foundry conference held Oct. 29 and 30 at Iowa City, Iowa, under the joint sponsorship of the Engineering college, State University of Iowa; the Quad-City chapter of the American Foundrymen's association; the northern Iowa Foundrymen's association, and the American Foundrymen's association, was in excess of the meeting a year ago. An interesting program of technical papers was presented on Friday and Saturday morning.

The meeting was opened officially in the chemistry auditorium on Friday morning by Prof. H. O. Croft, head of the department of mechanical engineering, University of Iowa. Prof. Croft introduced Dean F. M. Dawson of the college of engineering, who welcomed the foundrymen to the campus. The dean stressed the point that the university must keep in close touch with industry, and that through meetings of the conference type, this association may be maintained. One of the greatest problems of the day is providing the proper guidance for the men who are going to be the industrial workers of the future, according to Dean Dawson.

The technical session, with P. T. Bancroft, chairman, Quad-City chapter of the A. F. A., as chairman, discussed sand problems. Harry W. Dietert, Harry W. Dietert Co., Detroit, spoke on "Sand Control," beginning his discussion with the mold and the various factors, including permeability, mold hardness, resilience and refractoriness.

Control the Variables

Various methods are available to control the variables in the mold properties. These include control of moisture, control of sand grains through permeability, fineness and distribution, a control of clay, etc. Mr. Dietert illustrated his talk with various machines used to perform the standard tests on molding sand. He also operated a unit for heating the sample to the temperature of the molten metal to determine the expansion and contraction of the sand in the mold.

E. H. King, Hougland & Hardy Co., Evansville, Ind., spoke on "Natural Molding Sands." Mr. King outlined the extent to which producers provide technical control at the pit to insure uniform molding sand which will meet the specifications of the customer. He stressed the point that foundrymen should present their problems to the sand producer so that he may assist in supplying the type of sand suited for the conditions encountered. In closing he stated that natural sands will produce wonders in the foundry when completely controlled from the pit through the foundry operations.

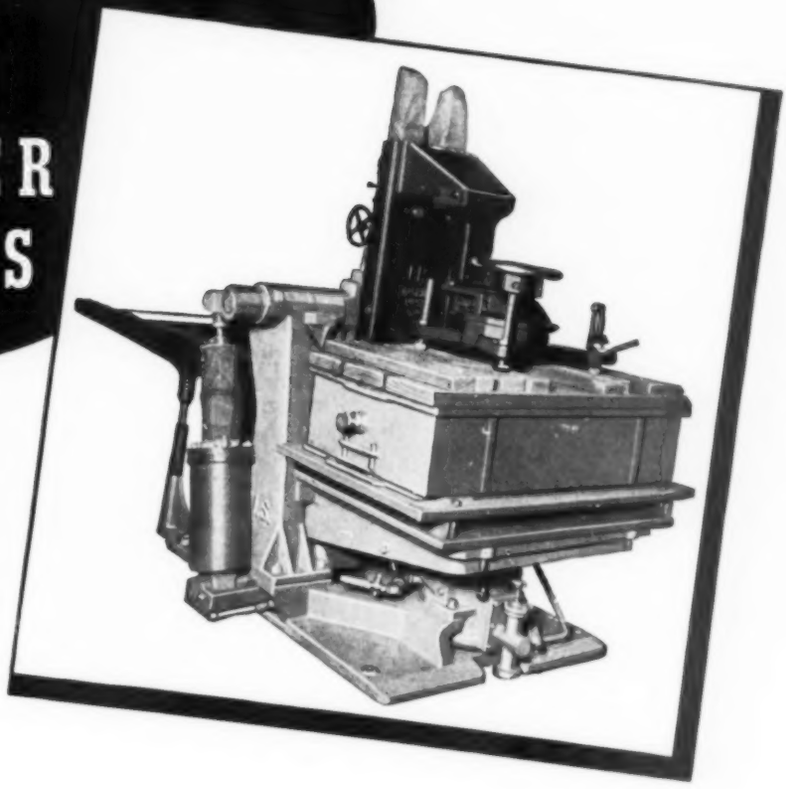
In response to a question as to how much the shrinkage is due to surface disintegration, Mr. Dietert stated that some of the shrinkage is due to that difficulty, but that most is due to a change in the clay as it goes from the solid to the liquid condition. About 95 per cent of the change is due to the clay. This is revealed by taking the same grade of sand grains and using different clays and amounts of clays on the various samples tested. Mr. Dietert explained the way in which the contraction and expansion testing equipment and results may be employed practically in the foundry. Expansion of the molding sand will result in rat tails, while contraction, which occurs in a heavy mold, causes the sand on the surface of the mold to flake off and a scab then develops on the casting surface. The question of facing sands was discussed and it was recommended that no new

(*Continued on page* 50)

Modernize Your Foundry . . .

with these

MODERN ROLL-OVER MACHINES



THERE'S NOTHING LIKE THEM FOR CUTTING MOLDING TIME and MOLDING COSTS

● No pits are needed. The center clamping and open end table handles overhanging flasks to the full tonnage capacity of the machines. Two roll-over cylinders, operating reciprocally, prevent stopping on center. Dash-pot control eliminates banging and dropped molds. Complete with an adjustable roll-out table, and a pattern draw that requires no unclamping or equalizing, these Johnston & Jennings machines give you *all* the advantages of air jolt, air clamp, air leveling, air roll-over, air pattern draw . . . and all the savings . . . in one machine. Send for a copy of the fully descriptive folder. It'll give you all details. What are your molding machine requirements?

THREE STANDARD SIZES			
Machine No.	Roll-Over Table	Flask Capacity in Lbs. (at 80 lb. air)	Pattern Draw
610	24" x 30"	600 lbs.	10"
815	30" x 40"	1200 lbs.	15"
918	40" x 48"	2000 lbs.	18"

The JOHNSTON & JENNINGS *Co.*

Addison Road and N.Y.C. Tracks

CLEVELAND . . . . . OHIO

(*Continued from page* 48)

sand be used for the purpose. Sand that has been employed in the production of a casting is heat treated, and therefore shows less expansion or contraction when the metal is poured against the surface of the mold.

The first afternoon session was devoted to "Testing and Melting," with Prof. A. V. O'Brien, University of Iowa, as chairman. Prof. H. L. Daasch, Iowa State college, Ames, Iowa, discussed "Physical Tests of Cast Iron." The speaker pointed out that any machine or structure has three general steps in its development, namely design, manufacture and use. All three are concerned with physical properties. The difficult problem is to understand the test procedure and to apply correctly the results of tests to best advantage of the designer, producer, and user.

Prof. Daasch stated that the designer works on the basis of physical properties that the particular casting will have when produced. The producer may check properties only after the part has been produced. Therefore, the only physical property tests, of use to the designer or producer, are those which have been made on other castings. For that reason the success of production depends upon having reliable test data which may be applied to the particular problem at hand. The best post-mortem test is a study of the service rendered by a particular structure developed in the casting.

The speaker discussed a few of the tests which may be made on castings, and outlined the shortcomings of each. Strength tests include tension compression, torsion, and transverse. Creep is a long time test and impact a short time test. Mr. Daasch stated that he does not believe the wear is proportional to hardness. He also stressed the importance of the damping properties of gray iron.

Tensile Test Bar

The speaker questioned the advisability of using the tensile test as a measurement of the strength of cast iron, since cast parts seldom are placed in tension in service. H. Bornstein, Deere & Co., Moline, Ill., pointed out the reason for using the tension test in the specifications as developed by the A. S. T. M. The most important consideration was the fact that the designer and engineer are familiar with the tensile test and its results, and therefore better understand data on that particular property when presented in specifications. Mr. Bornstein also said that it is possible to correlate hardness with other tests of cast iron. In his opinion, "A test bar is only a test bar," and he prefers to have a test on the casting. A. E. Hageboeck, Frank Foundries Corp., pointed out that it is possible to secure good results in test bars, but poor castings with metal from the same ladle.

In a talk "Analysis of Iron," John Fielding, State University of Iowa, Iowa City, presented a discussion and demonstration of methods used in testing cast iron for carbon, sulphur, manganese, phosphorus and silicon. Mr. Fielding pointed to some of the difficulties encountered in making proper determinations. It was brought out in the discussion that while a routine could be established and the details of making the tests be mastered in a short time, it is necessary to have a trained chemist or metallurgist available to check and to handle the situation when results are not coming properly.

The second portion of the afternoon was devoted to the subject, "Melting Practice," with John Ploehn, French & Hecht Inc., Davenport, Iowa, as chairman. Lewis D. McClaren, Republic Coal & Coke Co., Chicago, discussed "Foundry Coke" in which he outlined the equipment and process followed in the manufacture of by-product coke.

A. W. Gregg, Whiting Corp., Harvey, Ill., discussed "Operation of the Cupola." Mr. Gregg believes that placing the tuyeres below the windbox is a definite advantage in that it keeps the windbox free from slag. The speaker showed a number of slides illustrating cupolas, yard layout, charging equipment, duplexing with the air furnace, continuous pouring devices, and hot blast cupolas.

Mr. Gregg believes that all foundries must develop their own practice following a careful study of requirements in a particular plant. He

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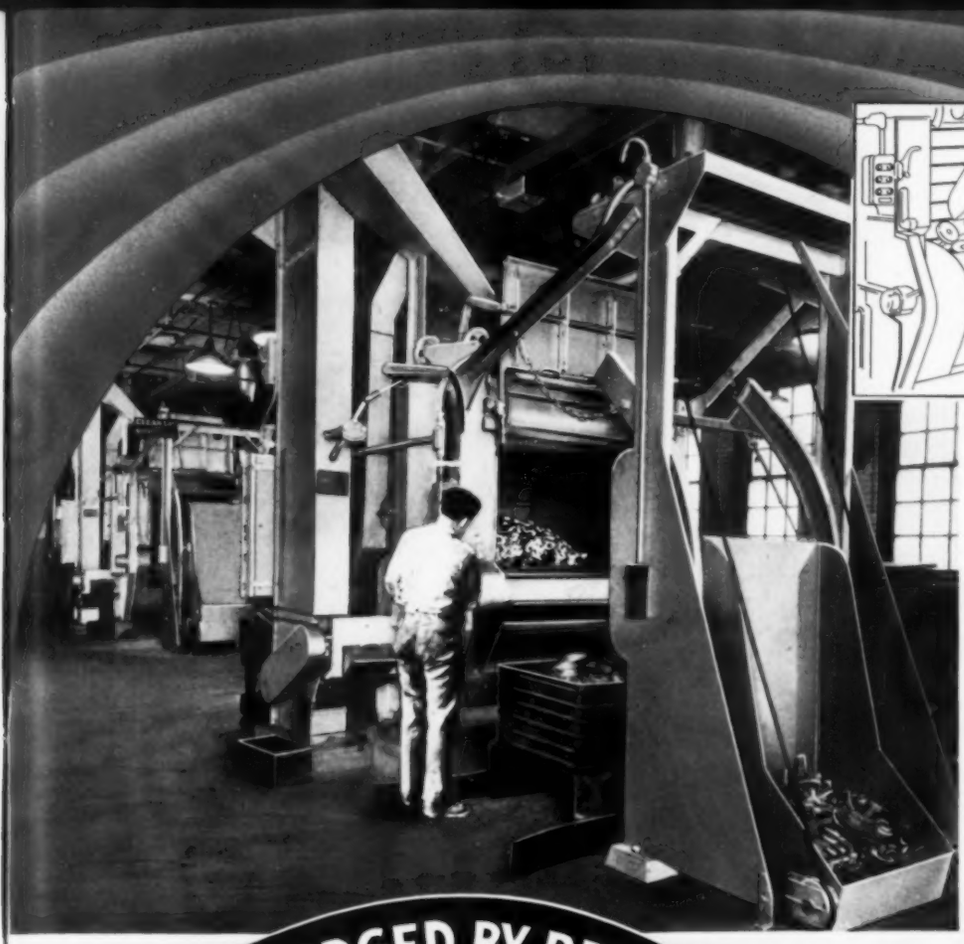

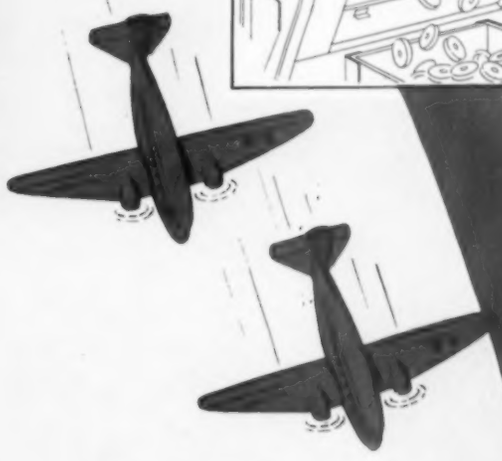

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Tumblast Record Breaking Speed is Sustained

A flighty performer can't stand the gaff. The winning design is American-designed — a combination of speed, endurance and constant peak performance, without breakdown delays at critical moments.

The reasons for the faster, sustained cleaning speed of the Tumblast-Wheelabrator are four: (1) automatic loading available (2) more rapid cleaning because of constant all-over blasting of the load (3) easy instantaneous inspection (4) automatic unloading. Nothing approaches the speed or quality of Tumblast-Wheelabrator casting cleaning!

Used for cleaning castings of all metals, the Tumblast provides a smooth, satiny mat finish requiring less labor, less power and less time than any former cleaning method.

The Tumblast is a utility machine and used in all sizes of foundries. It is made in four sizes for production and jobbing shops and cleans with equal facility small castings of one-half ounce in weight to medium sized castings 250 pounds in weight.

Three hundred and fifty foundry operators can't be wrong—and more than that number use the Tumblast-Wheelabrator to cut casting cleaning costs up to 50%.

Let us send you shop surveys of WHEELABRATOR production records so you can have first hand, unbiased information on this unusual device—send for this data now!

THE AMERICAN FOUNDRY EQUIPMENT COMPANY

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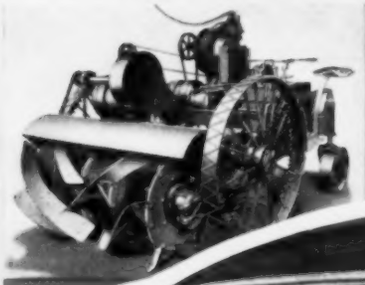
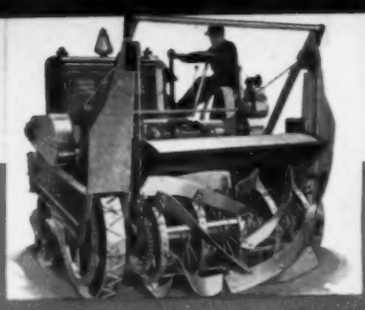
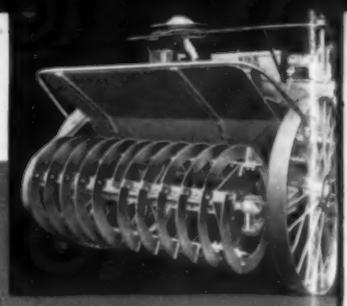
Makers of Abrasive Blast Equipment for Every Metal Cleaning Operation — dustube Dust Collectors, Sand Cutters, and Other Foundry Equipments

FOUR MODELS OF AMERICAN SAND CUTTERS ARE SHOWN—THE LOGICAL SAND PREPARATION MACHINES FOR EVERY JOBBING FOUNDRY—MODELS "M", "K", "AA" AND "PE"—ARE MADE IN SIZES TO SUIT EVERY SHOP CONDITION.







The fact that more than 1,100 American Sand Cutters have been sold proves conclusively the wide favor for this unique sand conditioning machine in foundries everywhere.

The reasons for this preference are plain: Sand Cutters are low in cost, fully portable, and highly efficient. They cut, mix, blend, and aerate the heap. The prepared sand is light, open and fluffy, and better molds and castings result. Conditioning your sand is a primary need in making better castings, and Sand Cutters are the simplest, low-cost answer. Designed for use in jobbing shops, ideal for separate floors or benches in production shops, Sand Cutters return their cost many times over in improved molds and better castings.

Sand Cutters are now offered in four models and several sizes of each — three improved models, types "AA," "K" and "PE" and new Model "M" featuring higher axle clearance; a new lawnmower type cutting cylinder; operating parts completely dust-sealed; ball bearings, gears and clutches moving in oil; and rugged, heavy-duty construction.

To Improve Your Sand Heap, Use a SAND CUTTER— *Models and Sizes for Every Shop Condition!*

The over-all width of each size Model "M" machine is only 16" wider than the cutting cylinder, two electric motors are used—one for operating the cutting cylinder, the other for motive power, steering, operating the cylinder hoist and electric cable reel.

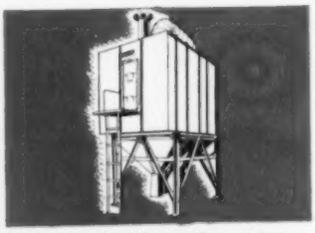
Cut your costs with Sand Cutters—there's a type and size for every foundry—write for operating reports—do it now!

THE AMERICAN FOUNDRY EQUIPMENT COMPANY
505 So. Byrkit St., Mishawaka, Indiana

THE AMERICAN SAND CUTTER CUTS, BLENDS, MIXES AND AERATES THE HEAP, PRODUCING A LIGHT, FLUFFY OPEN SAND. IT PILES INTO WINDROWS OR IN HEAPS CONVENIENT TO FLOORS AND BENCHES. CONDITION YOUR SAND WITH A SAND CUTTER!

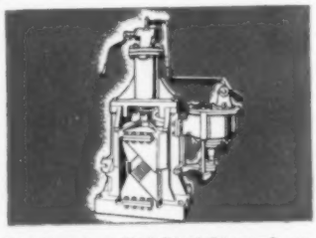
The American Line

American Foundry Equipments are the result of years of research, creative design and product development—years devoted to perfecting devices for improving working conditions—reducing labor fatigue—and generally benefiting the American molder and his employer. The measure of success that has been our reward has only served as an added stimulus for doing even better work.

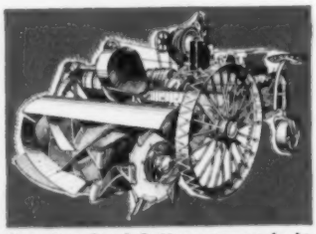


American dustube Dust Collectors, featuring high efficiency, are made in sizes for every dust suppressing purpose.

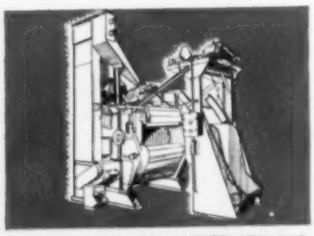
The American Core Machine is widely used for the rapid production of stock cores of any shape or size to 3'.



The American Rod Straightener is an ideal rod and wire cutting, straightening, and gagger forming machine.



American Sand Cutters are made in several models for sand conditioning in foundries of every size.



The American Tumblast WHEELABRATOR is the most efficient casting cleaning device ever offered the foundry industry.

American Blast Rooms are available for every type of job casting cleaning. They're engineered to fit.

American Featherweight Flasks and Jackets are the logical combination for economical bench molding.

(*Concluded from page* 50)
stated that cupolas also are to be used in connection with duplexing for open hearth furnaces in plants where blast furnace metal is not available.

Garnett P. Phillips, International Harvester Co., Chicago, presented a brief abstract of his paper "Cupola Practice," due to the lateness of the hour. The speaker discussed a chart showing the recommended bed height for different pressures. He also presented cupola operating data for plants specializing in agricultural work, giving statistics on cupola diameter, cross sectional area, weight of coke, weight of charge, blast data and melting rate per hour.

The annual dinner of the conference was held at the Iowa Memorial Union building on Friday evening, with Prof. H. O. Croft as toastmaster. A principal address was presented by Wiley B. Rutledge, dean of the law school, University of Iowa. Dean Rutledge provided an interesting discussion of the engineer or technical man and the lawyer. He stressed the point that the legal profession today needs men with training in both engineering and law.

Describes Various Activities

H. Bornstein, president of the American Foundrymen's association, presented an interesting talk which outlined the many ramifications and services rendered the foundry industry by the American Foundrymen's association. Robert E. Kennedy, technical secretary, A. F. A., expressed appreciation of the association for the work of the various sponsoring organizations in arranging the successful conference. Mr. Kennedy also introduced Norman F. Hindle, assistant technical secretary who recently returned to the staff after a serious illness.

A well-attended meeting at 8:30 a. m. Saturday featured a discussion on nonferrous metals, with John H. Diedrich, Blackhawk Foundry & Machine Co., Davenport, Iowa, as chairman. C. O. Thieme, H. Kramer & Co., spoke on "Metallurgy of Nonferrous Castings." That paper outlined numerous points of importance which must be considered in the casting of yellow brass, red brass, manganese bronze, aluminum bronze and nickel silver.

Production of manganese bronze must be done without contamination and the metal should be melted as quickly as possible. The metal is brought to a temperature of about 2000 degrees Fahr., stirred, cooled down and cast. Mr. Thieme emphasized the necessity of using a pyrometer in obtaining proper control of the metal. The bronze is poured without agitation or splashing and the lip of the ladle is placed as close to the sprue as possible. Since manganese bronze has a higher shrinkage than red or yellow brass, a larger feeder is needed.

The aluminum bronze combines strength and ductility with high resistance to corrosion. Metal is melted under dry charcoal or glass and that must not be overheated. The oxides should be skimmed off and the metal poured at as low a temperature as is possible. While the sand is not rammed differently than in the case of red brass, the mold needs more venting. The moisture content of the sand should not exceed 6 per cent. The metal must be poured slowly, free from any agitation. Usually a horn gate is used, the riser being placed above the heavy section. Risers usually are made higher than for ordinary red metals. Aluminum bronze containing 8 per cent or more of aluminum is susceptible to heat treatment.

Glass Forms Slag

Nickel silver metal is melted in an oil or gas fired furnace. Glass is thrown on the bottom of the crucible, and as the glass melts first, it forms a good slag. Pouring temperature is between 2400 and 2550 degrees Fahr. and the metal must not be poured too hot. The metal is melted rapidly, and no soaking time is allowed. The metal has a higher shrinkage than red brass, and is susceptible to age hardening.

In the intermission before the second session, Dean Dawson introduced Dr. Eugene Gilmore, president of the University of Iowa. Dr. Gilmore extended a welcome to the visitors and expressed the pleasure of the university in having such groups meet on the campus. He pointed out than any association between men of practical knowledge and the academician must produce results of value to all.

The last session was devoted to "Alloy Cast Iron," with A. E. Hageboeck, Frank Foundries Corp., Moline, chairman. E. K. Smith, Electro Metallurgical Sales Co., Detroit, pointed out that a base metal good for one particular alloy addition may not be at all satisfactory for another. He stated that chromium is used to resist wear, heat and other forms of corrosion. The speaker stated that higher pouring temperatures made it possible to alloy chromium in the ladle satisfactorily. Mr. Smith also showed the effects of chromium on the various physical properties of gray cast iron.

R. G. McElwee, Vanadium Corp. of America, Detroit, expressed the opinion that as yet vanadium has not received as much attention as it should in the cast iron field. The alloy vanadium is used infrequently alone, since it works so well with the other alloys. Mr. McElwee believes that if it is possible to get a satisfactory base metal to which alloys are to be added, the inclusion of vanadium in the alloys used, will permit more uniform control day by day.

Mr. McElwee stated that the tensile test may not represent conditions in the casting, especially if sections of various sizes are represented in the cast piece. In his opinion, vanadium makes iron less sensitive to the rate of cooling. In conclusion, he stated that if it is desirable to avoid acicular pearlite, vanadium is used to change the acicular pearlite to lamellar pearlite.

V. A. Crosby, Climax Molybdenum Co., Detroit, advised a thorough consideration of the results in service and properties to be obtained through the addition of molybdenum, before the matter of price is considered. The speaker claimed that molybdenum improves all of the properties in the iron. He presented slides to show the effect on increasing chill, tensile strength, transverse strength, deflection, brinell hardness, structure, wear resistance and heat resistance.

Referring to the previous speech, Mr. Crosby stated that several materials could be used to change acicular pearlite or Bainite to lamellar pearlite. In his experience, maximum toughness is secured in an iron having acicular pearlite or Bainite structure.

Affects the Structure

Don J. Reese, International Nickel Co., Bayonne, N. J., replaced Fred J. Walls of that company, who was unable to attend because of illness. Mr. Reese stressed the fact that through the use of alloys and the normal alloying materials found in cast iron, perhaps a million different materials may be produced, all under the gray iron classification. The foundry is limited in the number of alloys produced by the materials available, and by the variations in practice.

Mr. Reese showed through slides, how the grain of iron may be closed by the addition of nickel. From ½ to 2½ per cent addition is considered normal. Irons with 4½ or more per cent nickel are used for wear resistance. Corrosion and heat resistance irons are produced with from 14 to 16 per cent nickel. Nickel decreases the tendency to chill, and for that reason some foundrymen are using that alloy simply to decrease casting problems. The speaker also stated that nickel improves the machinability of cast irons.

Bureau of Mines, Washington, has published bulltin No. 404 entitled, "Burning of Coal and Coke Treated with Small Quantities of Chemicals." It relates to tests of coal and coke treated with various compounds which are sold as fuel savers, smoke eliminators, etc. Copies of the bulletin may be obtained from the superintendent of documents, for 15 cents.

Twin City

TWIN CITY Foundrymen's association held its second meeting of the year on Monday evening, Nov. 15, at Minneapolis, with a banner attendance of 60 members and guests. Dinner was served at the Elmwood cafe after which the group visited the plant of the Minneapolis Electric Steel Casting Co.

S. V. Wood, president of the Minneapolis Electric Steel Co., welcomed the group and then introduced the various foremen of the plant. Herbert Blasjo, chief metallurgist, described briefly the operations of melting and heat treating for steel castings. The electric melting furnace, the heat treating furnaces, and the core ovens were in operation.

Connecticut

REGULAR monthly meeting of the Connecticut Nonferrous Foundrymen's association was held Nov. 16 at Hotel Duncan, New Haven, Conn., with T. Joseph Judge, chairman, presiding. A large number of members and guests were present to participate in a discussion on "Effect of Impurities in Red Brass and Methods of Determination." The subject was divided into two parts with David Tamor, Reading, Pratt & Cady Co., Hartford, Conn., leading the discussion on the foundry practice phase while Paul A. Leichtle, spectroscopist, Chase Brass & Copper Co., Waterbury, Conn., led the discussion on the technical phase.

A nominating committee was appointed to present a slate of officers for 1937-38 at the next meeting of the association. The committee consists of Walter J. Kenney, North & Judd Mfg. Co., New Britain, Conn., chairman; George Mathieson, Safety Car Heating & Lighting Co., New Haven; David Tamor, Reading, Pratt & Cady Co., Hartford; S. Conlin, Derby Castings Co., Seymour, Conn.; and Ben Stewart, Bridgeport Deoxidized Bronze Co., Bridgeport. The next meeting of the association will be held Dec. 21 at Hotel Duncan, New Haven, and the speaker will be George Belknap, Belknap Mfg. Co., Bridgeport, who will discuss "Cores and Core Blowing."

Quad-City

THE November meeting of the Quad-City chapter of the American Foundrymen's association was held Nov. 15 at the Blackhawk hotel, Davenport, Iowa. There were 90 present for dinner and about 125 for the technical session. Many visitors and men from engineering divisions of various concerns in the area attended. P. T. Bancroft, chairman of the chapter, presided.

James R. Allan, assistant manager, industrial engineering and construction department, International Harvester Co., Chicago, was the principal speaker. His topic was "The Fundamentals of Design, Construction, Operation and Maintenance of Exhaust Systems." He briefly told of what has been done by the A. F. A. up to the present, and then spoke of the additional code on this particular topic that now is being prepared for the industry.

Mr. Allan discussed the scope of this code in regard to the proper design of exhaust systems to take off dust, gases, solids and fumes in various operations, safety features of particular units, successful operation and supervision and maintenance of the equipment. Descriptions were given of various types of systems and their functions in each case, along with the importance of following the set specifications desired and not something else in regard to design and operation. Many interesting questions were asked of the speaker.

The next meeting will be held at the LeClaire hotel, Moline, Ill., on Dec. 20 and the subject will be "Malleable Iron."

Philadelphia

SECOND fall meeting of the Metropolitan Philadelphia chapter of the American Foundrymen's association, was held at the Engineers' club, Philadelphia on Nov. 12. In spite of inclement weather, more than 70 attended the dinner where Fred Byrod, sports writer, *Philadelphia Inquirer* spoke on "Football Winners Next Saturday," and explained how the sports writers make their selections. Over 100 attended the technical session at which Chairman Harold Henszey presided, and spoke briefly on plans for the coming year. J. S. Spencer, chairman of the membership committee, requested co-operation of the entire membership in the drive for new members. William G. Coleman, secretary-treasurer, gave some highlights on what to expect at meetings to be held within the next few months.

The subject of the evening discussion was "Structure and Wear of Gray Cast Iron," by Paul S. Lane, metallurgical engineer, American Hammered Piston Ring division, Koppers Co., Baltimore, Md. He illustrated his talk with lantern slides showing structural composition of gray iron, physical properties of various constituents such as graphite, ferrite, pearlite, etc., and influence of mass or sectional thickness. Mr. Lane explained that considerable data are available on chemical composition, strength, hardness, etc. of various irons, but little work has been done in correlating wear resistance to the structural makeup of the metal, and the influence on wear resistance by the form and distribution of graphite, grain size and hardness.

As Mr. Lane described and illustrated his procedure and method of determining the wear on piston rings, he showed the many tests he had made on brake shoes and engine cylinder castings, and how they were rated and measured for wear resistance by their microstructure.

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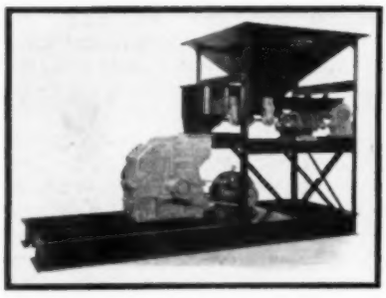

BARTLETT-SNOW CORE CRUSHER...a complete unit—with hopper, feeder and swing hammer crusher... ideal for reclaiming core sand.

BULLETIN No. 75. Complete with 120 illustrations and 26 engineering diagrams, this 44 page booklet describes the Bartlett-Snow method of securing less costly; more efficient operation. Send for one!

● Received from the shakeout, reconditioned and retempered and distributed back into the molder's hoppers overhead, sand moves over the "profit route." Larger outputs from the same or smaller floor space are secured . . . in shorter time. Delay and confusion are avoided. Rejections are lowered. A cleaner, more orderly—and more profitable—operation is secured than would otherwise be possible.

Belt conveyors with plows for distributing sand to large hoppers and flight conveyors for filling long rows of small hoppers both reflect the advantages of Bartlett-Snow design and manufacture. Let us show you the economies and savings that various arrangements of Bartlett-Snow sand conditioning and overhead distributing systems have made in large and small, continuous production and jobbing foundries—and the savings they can make for you. The investment for the equipment need not be large. What are your foundry problems?

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BARTLETT·SNOW

SAND HANDLING AND SAND CONDITIONING EQUIPMENT
MOLD CONVEYORS AND ACCESSORY FOUNDRY EQUIPMENT

(*Continued from page* 54)
He spoke on the rigid specifications that are demanded at times by the designing engineers and stressed the need of closer co-operation between the engineers and foundrymen. At the close of Mr. Lane's talk, considerable discussion arose on various points. The door prize, a crisp new five dollar bill, was won by J. Durant, Sellers & Co., Philadelphia. The next meeting of the Metropolitan Philadelphia chapter will be held on Dec. 10 and the speaker will be P. E. McKinney, metallurgical engineer, Bethlehem Steel Co., Bethlehem, Pa. His subject will be "Steel Castings."

Detroit

THE November meeting of the Detroit chapter, A.F.A. was held at the Fort Shelby hotel, on Thursday, Nov. 18. Fifty-eight members and guests were present for dinner and 71 attended the meeting. Immediately following dinner, two roundtable discussions on cupola practice with Ira Cheney as leader and sand control with Harry Dietert as leader were held.

Following the roundtable discussion Chairman R. B. Crawford introduced the speaker of the evening, F. A. Melmoth, vice president, Detroit Steel Casting Co. The speaker gave a very interesting talk on "Controlled Directional Solidification" with the assistance of lantern slides to illustrate the theory. At the conclusion of his talk, a spirited discussion ensued.

Birmingham

BIRMINGHAM District Chapter of the American Foundrymen's Association held a regular meeting at the Tutwiler Hotel, November 19. Eugene W. Smith, Evansville, Ind., presented the discussion of the evening on the subject "Molding Sand in the Foundry." Mr. Smith covered in length the analysis and testing of sand, casting defects and their causes, etc.

Lester N. Shannon, Stockham Pipe Fittings Co., former chairman of the chapter and a member of the board of directors of the A. F. A., presented a report of the recent meeting of the executive committee of the National Association held in Chicago. He outlined a number of suggested changes in by-laws which are being considered by the executive committee.

Arthur Woody reporting for the membership committee, stated that the total membership of the chapter had reached 211. Eleven new members were entered at the meeting. W. O. McMahon announced that Ernest R. Starkweather, Titanium Alloy Mfg. Co., Niagara Falls, N. Y. would talk at the January meeting of the chapter.

Northern Illinois

A MEETING of the Northern Illinois Foundrymen's association, held Nov. 9 at Hotel Freeport, Freeport, Ill., featured a talk by George Zabel, Fairbanks, Morse & Co., Beloit, Wis., on "Engineering and Its Relation to the Foundry." In his introduction, Mr. Zabel spoke of the attitude of the molder toward the work, stating that while the molder took pride in doing a difficult job requiring special methods, that type of work was a detriment to production at a profit.

Insufficient training in schools because of lack of time for adequate instruction in foundry practice was given as the underlying reason for bad design requiring special foundry methods. A number of slides were shown illustrating the behavior of cast iron when poured under various conditions and in types of castings ranging from heavy diesel engine cylinder blocks to light pump impeller casting. The defects occuring from faulty design were illustrated, also the methods used to correct them. Changes in design that resulted in savings in cleaning, molding and core making were discussed.

The following members were elected to office to serve for the ensuing year: C. M. Dale, Liberty Foundries, Rockford, Ill., president; John T. Clausen, Greenlee Bros. & Co., Rockford, vice president; George K. Minert, Gunite Foundries Corp., Rockford, secretary and treasurer; and L. Perry, Liberty Foundries, Rockford, technical secretary.

The following members were elected to the board of directors: A. W. Weigert, George D. Roper Corp., Rockford; August Christen, Arcade Mfg. Co., Freeport, Ill.; and W. L. Davey, Davey Pump Co., Rockford, Ill.

Milwaukee

MILWAUKEE Chapter of the American Foundrymen's association, in co-operation with the Milwaukee branch of the National Metal Trades association, the Employers' Association of Milwaukee, and the Industrial Relations Association of Wisconsin, heard Whiting Williams, Cleveland, speak on "What Do Man and Managers Want of Each Other" on Tuesday, Nov. 2. Seven hundred attended.

Mr. Williams stated that labor troubles are caused less by big complex issues than by accumulation of small individual grievances. Most of these grievances lately have arisen from men's fear that they would lose their jobs through favoritism. The CIO unions have grown rapidly because they offer to such men the protection of a belligerent outsider, according to the speaker. These groups, however, encounter difficulty when the return of prosperity permits the displacement of fear by hope—hope for a better job up the ladder of job importance. At this point help cannot be given by the mass unions for the reason that these do not believe in the differentials usually paid for skill.

As a result it is all but impossible for the industrial or mass unions to hold skilled, semiskilled or unskilled men together in one group throughout good times and bad without the help of the closed shop and the checkoff. Mr. Williams said these arrangements, in turn, are all but impossible of attainment. Of all this the lesson for employers is to establish closer contact with their workers, for allaying the fear of unjust loss of the job and for justifying hope for better ones without interference or favoritism.

Approximately 100 members and guests of the Milwaukee chapter attended its National Officers' night held at the Schroeder hotel, Milwaukee, on Nov. 19. Guests of honor were A.F.A. President Hyman Bornstein, John Deere & Co., Moline, Ill.; A.F.A. Executive Vice President C. E. Hoyt, and A.F.A. Technical Secretary R. E. Kennedy. Walter Gerlinger, president of the chapter presided and introduced the various guests who spoke briefly.

Speaker of the evening was Hyman Bornstein who discussed gray iron with specific reference to practices employed in the Waterloo, Iowa, tractor division of his firm. He said that selection of raw materials for the cupola depended on the market price and geographical location. Essentially, the iron charges are composed of pig iron, silvery pig, auto cylinder scrap, No. 1 scrap, steel scrap, briquetted iron borings and briquetted steel turnings. The latter two comprise 17.5 per cent of the charge.

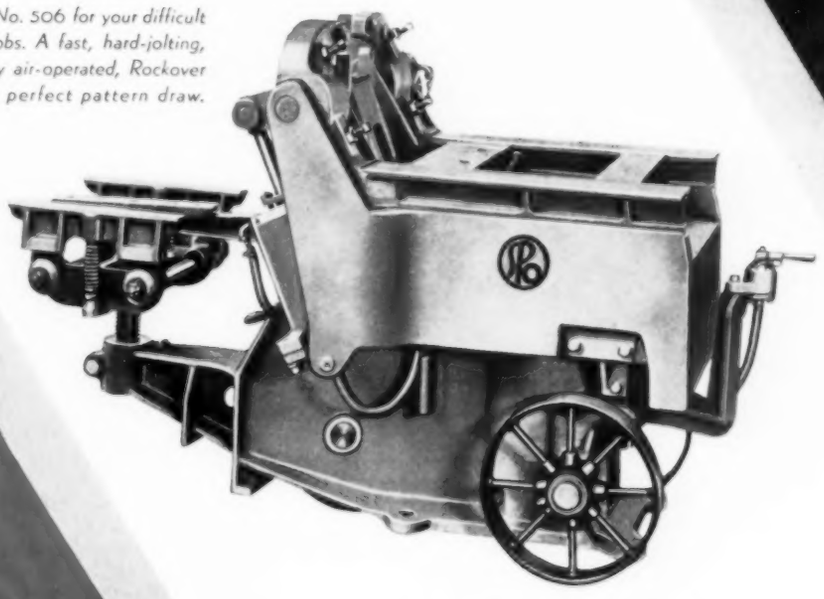
Total cost of cast iron briquetting is $1.01 per ton while that on steel turnings is $1.52 per ton, according to Mr. Bornstein. Four cupolas are used alternately, and of the two in operation on one day, one is in blast 15 hours, and the other 8 hours. Average melting rate is 18 to 20 tons per hour. Cupola beds are 52 inches above the top tuyeres, and 4000-pound iron charges with 480-pound coke splits are used. Typical analysis of the iron shows 3.25 per cent total carbon, 2.40 per cent silicon, 0.110 per cent sulphur, 0.23 per cent phosphorus, and 0.60 per cent manganese.

The iron has a traverse strength of 2650 pounds on the Standard A. S. T. M. bar with 0.26-inch deflection, and the brinell hardness of the bar is 228. Tensile strength determinations show a range from 35,000 to 40,000 pounds per square inch. Met-

(*Continued on page* 59)

SEASON'S GREETINGS

SPO No. 506 for your difficult drag jobs. A fast, hard-jolting, entirely air-operated, Rockover with a perfect pattern draw.



An installation of these machines is now producing 50 *good* molds per hour, per machine, with the sand shoveled from floor heaps, at the plant of

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Cleveland

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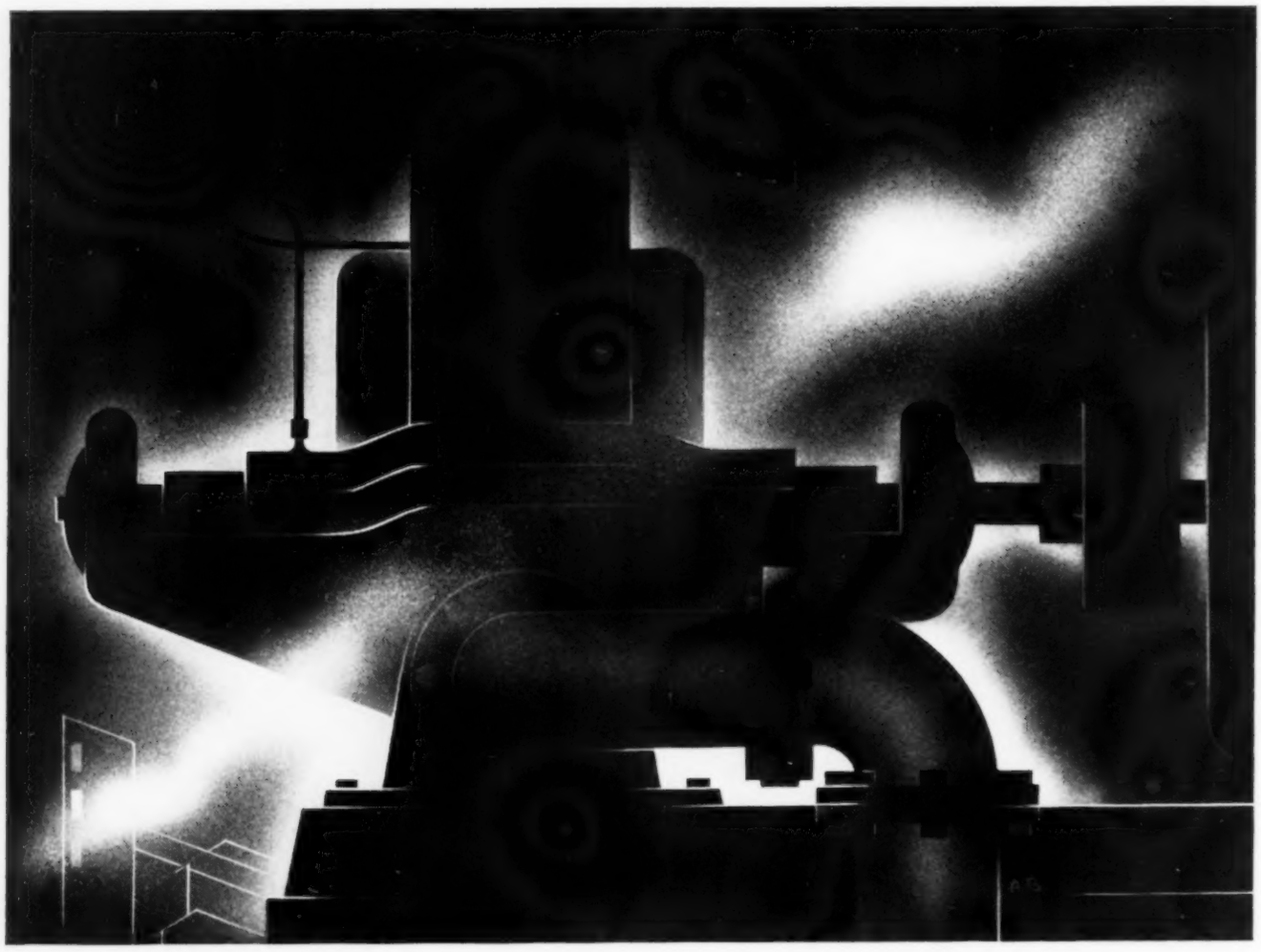

Obvious—or Effective

WHEN machine parts failures become a problem, the obvious remedy is not always the most effective.

An important and alert manufacturer of centrifugal pumps, for instance, had impeller trouble. Steel impellers were the obvious answer, but cost was a factor to be considered.

A .75% Moly iron was used—and the trouble was eliminated. This hard, strong, fine-grained iron had the necessary resistance to the abrasive action of the material handled by the pump. And—it held down the manufacturing cost.

Moly toughens cast iron, assures uniform structure throughout varying sections, and reduces porosity. It produces irons with high wear resistance and greater strength. It cuts production cost by eliminating many of the causes of rejects.

Our technical book, "Molybdenum," contains practical data on Moly irons and steels. It will be sent on request—as will our monthly news-sheet, "The Moly Matrix." Be free to consult our laboratory on special ferrous problems. Climax Molybdenum Company, 500 Fifth Avenue, New York City.

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MOLY

(*Continued from page* 56)
al at the cupola spout averages 2800 degrees Fahr. Cylindrical covered mixing ladles and main transportation ladles are employed, and have been found to result in an appreciable conservation of heat. For example in the transportation ladles a heat loss of 15 to 23 degrees Fahr. per minute occurred with open ladles while with closed, insulated ladles the loss is 8 to 10 degrees per minute.

Addition of alloys where required is made in the transportation ladles. In some cases Mexican graphite is added to reduce the tendency toward formation of hard corners and edges. Close control is maintained on the total carbon content of the iron through frequent chemical determinations, and adjustment of the coke splits. Chill characteristics of the iron are determined by chill test bars poured every 15 minutes. The bars are ¾ x 2 x 4 inches. One face is cast against a chill, and the others are formed in a dry sand core.

Northern California

NORTHERN California chapter of the American Foundrymen's association had a very successful meeting on Nov. 12, with J. C. Beswick, California state department of education, explaining the apprentice training privilege now offered in the various trade schools. His audience was deeply interested as the proper training of apprentices for foundry work has been uppermost in the minds of many for some time. The committee will undoubtedly have a good report to render when the work gets under way.

An added feature of the evening was *Old Timers' Night*, marking the end of the second year for the chapter. A record of the time actually spent in foundry work by chapter members ran up to 1172 years, the average being 32 years. One man present still is working at the trade he has followed for 60 years. Several present laid no claim to having worked in the sand, but they were familiar with it. The meeting was held at the Whitcomb hotel, San Francisco, with Charles Hoehn, chairman, presiding.

Pittsburgh

REGULAR monthly meeting of the Pittsburgh Foundrymen's association was held at Webster Hall hotel on Monday evening, Nov. 15. J. S. Vanick, metallurgist, International Nickel Co., New York, discussed the applications of alloyed cast iron for: (1) Construction of static and dynamic structures. (2) Greater loads as in machine construction. (3) Heavy duty and wear in crankshafts and camshafts. (4) Applications where impact strength, stiffness, toughness and heat and corrosion resistance are important.

The meeting was well attended, with approximately 75 members present. Mr. Vanick's talk permitted discussion of the effects of nickel, chromium, molybdenum, copper and other alloys now in common use. The talk was illustrated with lantern slides.

Gray iron and the alloying of gray iron were the chief topics during the discussion period, which was led by J. H. Johnston, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. The association's program in obtaining exemptions under the new Pennsylvania 44-hour-week law, which becomes effective Dec. 1, provided an interesting topic. Many petitions have been presented by foundries for exemptions and it is believed that blanket variations may be allowed to the industry. The Pittsburgh Foundrymen's association has appointed a committee to study the 44-hour law.

Chicago

AROUND table discussion of sand attracted nearly 200 to the monthly meeting of the Chicago chapter, American Foundrymen's association at the Medinah club, Nov. 8.

In addition to the session on sand, two guest speakers gave brief talks. R. G. Guthrie, metallurgist, Peoples Gas Light & Coke Co., gave a brief talk on "Snakes". Cyril Dadswell, steel foundry manager, English Steel Co., Sheffield, England, presented an interesting comparison of features of foundry practice in England and the United States. Mr. Dadswell came to this country to inspect various plants. He reported that the general impression in England regarding the finish of steel castings produced in the United States is erroneous in that surface condition is much better than is understood in Great Britain.

Three separate round tables were conducted on sand. A. W. Gregg, Whiting Corp., led the discussion of steel foundrymen, while J. D. Burlie, Western Electric Co., presided at the nonferrous table, and R. K. Akin, Chicago Malleable Castings Co., conducted discussion on gray iron and malleable foundry sand problems. H. W. Dietert, H. W. Dietert Co., Detroit, presented a short discussion before each of the three groups.

The Chicago chapter has announced preliminary details of a lecture course to be started early next year. A program of eight lectures and two plant visits has been arranged. The lectures will be given at the Peoples Gas building auditorium, 122 South Michigan avenue, on Monday evenings. The subjects of the lectures follow: Iron from Mine to Finished Casting; Molding and Coremaking Materials; Sand Testing and Demonstration of Testing Equipment; Elementary Metallurgy (two lectures); Melting Practices; Faulty Castings and Remedies: and Foundry Practice Around the World.

J. J. Fox, Wisconsin Steel Works, is chairman of the lecture course committee.

New England

AN EXCEPTIONALLY large number of the members of the New England Foundrymen's association were present at the regular monthly meeting which was held on Nov. 10, to hear Leroy P. Robinson, director of core oil sales, Werner G. Smith Co., Cleveland, speak on "Core Room Problems."

Mr. Robinson discussed the proper selection of core sands, binders, and then described in detail the proper ratios of sand and oil to use, and the latest methods of mixing. That was followed by a comprehensive study of moisture control, baking and venting of cores, etc.

Mr. Robinson mentioned that an important factor was the proper inspection of cores, and gave specific examples of th advantages of correct inspection in the manufacture of good castings. Considerable discussion followed his talk, and after the meeting broke up, many of those present took the opportunity of renewing their acquaintanceship with Mr. Robinson, who formerly was located in the New England district for many years.

Preceding the speaker, a fine motion picture entitled, "Coal Mining," was presented with the compliments of the New England Coke Co., Everett, Mass., which showed actual operations in coal mining.

Southern California

THE Southern California chapter of the American Foundrymen's association held its regular meeting on Nov. 17 at the Central Manufacturing district, Vernon, Calif. Approximately 90 members and guests attended. Robert Gregg, chairman of the chapter, presided and announced that the chapter now has a membership of 97.

G. W. Merrefield, Kay Brunner Steel Products Co., Los Angeles, presented an interesting talk on "Casting Versus Welding". He discussed the recent propoganda and advertising of the welding equipment interests in which questionable claims of castings being replaced by welded products have been made. He urged the necessity of foundrymen to take issue with some of the obviously extravagant claims.

Principal speaker of the evening

was J. E. Stevens, ceramic engineer, Emsco Refractories Co., Los Angeles, who spoke on "Suggestions Regarding the Purchase and Use of Refractories in the Foundry". He pointed out that there are three methods of selecting refractories: (1) The price method which is based upon the erroneous conception that a firebrick is just a brick and not a refractory; (2) The "rule of thumb" or the old method of trial and error; (3) Co-operation with manufacturers of ability and known repute, with the exchange of pertinent information between the buyer, user and manufacturer, so that the service conditions can be fully understood by the manufacturer of refractories to obtain the most intelligent recommendations. Mr. Stevens then discussed the various factors which cause refractory disintegration, and how those factors may be recognized.

Following the presentation of his talk, Mr. Stevens answered many questions in the general discussion which followed. Plans for the December meeting of the chapter will be in charge of the entertainment committee of which W. A. Ashman, Balfour Guthrie & Co. is chairman.

St. Louis

THE first practical meeting of the year was held by the St. Louis District chapter, on Nov. 11, at the York hotel, St. Louis. Up to this meeting chapter members and officials had no opportunity for a real get-together inasmuch as the October meeting was eliminated due to participation in the first annual conference at Rolla and the September meeting had been given in conjunction with the American Society of Metals.

A keen spirit of interest and earnestness was shown by all chapter members and plans for the years activities. The conference at Rolla, had introduced A.F.A. work, spirit and plans to many in this district who hitherto had not fully realized the many advantages of associating with an organization specifically interested in the promotion of a co-operative plan to improve foundry and kindred activities through interchange of experiences, plans and purposes.

As a result of this enlarged acquaintanceship throughout the territory, secretary J. W. Kelin announced the names of a large group of new members to the roll indicating a keen sense of real activity on the part of the membership committee headed by R. K. Durkan.

During the business session various reports of committees were presented and appointment of new committees was announced by the Chairman, G. S. Haley. Further information on the new committees will be presented in the report of the next meeting.

Upon proper motion and second the chapter unanimously voted to hold another regional conference at the Missouri School of Mines and Metallurgy, Rolla, Mo., during the Fall of 1938. The chairman then announced the reappointment of the same committee to resume charge of this conference—the committee headed by Louis Desparois and composed of Webb Kammerer, G. S. Haley, C. R. Culling and J. W. Kelin.

The speaker of the evening, W. F. Piper, Beardsley & Piper Co., Chicago, was then introduced. He displayed a novelty moving picture outlining in detail many colorful scenes that he had viewed and photographed on a trip around the world. Following that motion picture an open forum was held.

Northeastern Ohio

APPROXIMATELY 75 members and guests attended the third regular monthly meeting of the Northeastern Ohio chapter of the American Foundrymen's association which was held Nov. 18 at the Institute of Lighting, Nela Park, Cleveland. Through the courtesy of the General Electric Co. a plant visitation was made to the Pitney Glass Works of the firm, where chapter members had an opportunity to see how electric lamp bulbs are produced automatically at a high rate of production.

Following the plant visitation, the chapter returned to the Lighting institute where it was entertained by an interesting motion picture film entitld, "From Now On," which depicted application of General Electric Co. electrical household equipment. The members then adjourned to the cafeteria for dinner, where L. P. Robinson, Werner G. Smith Co., and chairman of the entertainment committee, announced completion of plans for the chapter's annual Christmas party which will be held Dec. 16 at the Hollenden hotel, Cleveland.

After dinner the members returned to the institute where John B. Smith, lighting engineering department, General Electric Co., discussed lighting problems with particular reference to industrial lighting. He pointed out that present conditions required in general a close application of the eyes, and that good lighting is required to prevent eye troubles. He stated that a survey of a large number of industries showed only an average illumination of 3 foot-candles as compared to an indicated required illumination of 25 to 30 foot-candles.

Contrasting artificial lighting conditions with natural outdoor lighting he said that illumination on rainy days was on the order of 200 foot-candles; in the shade on a bright day about 500 foot-candles, and in bright summer sunshine the illumination ranged from 8000 to 10,000 foot-candles. Mr. Smith pointed out that one of the problems of lighting was to secure adequate light without glare, disconcerting shadows or other eye discomfort, and with true color rendition. In his opinion the best type of industrial lighting was secured by use of combination fixtures employing mercury and tungsten lamps arranged to provide an average illumination of 25 to 30 foot-candles.

Mr. Smith indicated that a survey showed that present investment in industrial lighting was approximately 2 per cent of the capital investment, and that the cost of lighting was about 0.3 per cent of the cost of all production. He believes that through a slight increase in both percentages, adequate lighting for industry in general can be secured. By proper lighting numerous advantages would accrue, and those include: Reduction of accidents, improved quality of goods produced, efficient production, decreased spoilage, better morale, better supervision reduced eyestrain, and possible 24-hour operation if required.

At the close of Mr. Smith's talk H. G. Schiller, Institute of Lighting, conducted the group to various rooms where demonstrations of suitable lighting for different types of rooms were presented, and the meeting closed with a brief discussion on the "Mysteries of Lighting," by Walter Werner, also of the institute. Fred Grundy, Kilby Mfg. Co., Cleveland, won the door prize, a handsome library table lamp made available through the courtesy of Mr. Connelly, Buckeye division, General Electric Co., Cleveland.

Chilled Car Wheels

Engineering Experiment station, University of Illinois, Urbana, Ill., recently has published bulletin No. 294 entitled "Tests of Strength Properties of Chilled Car Wheels," by Frank E. Richart, Rex L. Brown and Paul G. Jones. The bulletin is a report of an investigation conducted by the Engineering Experiment station in co-operation with the Association of Manufacturers of Chilled Car Wheels, and describes in detail the various tests applied, and the conclusions drawn from the results obtained. Copies of the bulletin may be obtained from the Engineering Experiment station, Urbana, for 85 cents.

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2. CLEANING THE CASTING
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Every foundry operator is invited to see HYDRO-BLAST at work . . . shooting hard complex cores . . . removing core rods without bend or distortion . . . cleaning difficult castings . . . classifying sand . . . WITHOUT CREATING DUST.

One look at the Hydro-Blast system in operation will convince you why sand and water make the ideal combination for cleaning castings at lower cost, *and without creating dust.*

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Make Spectrographic Analysis Of Cast Iron for Aluminum

By H. B. VINCENT and R. A. SAWYER
Department of Physics, University of Michigan

THE authors have reported elsewhere (1, 2, 3, 4) the development and installation at the plant of the Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich, of a spectroscopic method of analysis by means of which a sample of cast iron may be analyzed for chromium, copper, manganese, molybdenum, nickel and silicon in 7 minutes elapsed time with an accuracy exceeding that of routine chemical wet methods. This spectroscopic laboratory has proved itself so reliable that the chemistry laboratory has ceased entirely to do any of the control analysis of the metallic constituents in the iron, and the company, which has long prided itself on the quality of its production, has found our rapid and frequent analysis of marked benefit in holding composition within narrow limits. The principles worked out in this development have been applied to the analysis of cast iron for aluminum.

An engineering research project, in which the Department of Chemical and Metallurgical Engineering at the University of Michigan has been interested, has concerned a study of cast iron containing from 3 to 7 per cent aluminum. Since chemical methods are able to determine the amount of aluminum in the casts only with great difficulty and inaccuracy, the authors investigated the analysis of aluminum spectrographically, using the condensed-spark source developed for foundry control. It soon was established that analyses could be carried out with good accuracy, since readings proved repeatable with adequate fidelity, but no samples of known composition were available for calibration. Plots of spectrographic readings against analyses performed by chemical wet methods gave erratic results.

A set of special melts, following a very careful mixing practice, was tested spectrographically, and it was found, from the spectrographic readings alone, that each melt had suffered a loss of aluminum proportional to the total amount of aluminum added to the ladle. The per cent recovery of aluminum shown by all available chemical analyses varied from 50 to 100 per cent, but gave an average of about 83 per cent. A calibration curve was drawn assuming a recovery of 83 per cent to be correct, and it was found possible to analyze for aluminum as readily as for other metals. While the determinations may involve a systematic error due to the lack of satisfactory calibration samples, the analyses are consistent and repeatable and the accuracy is certainly much better than that of the chemical analyses on which the calibration is based.

Three typical sets of duplicate analyses, run from sprues detached from the castings, are shown in the accompanying table.

These analyses show an average variation of 1.26 per cent of the amount of aluminum present. The maximum variation is less than 2.5 per cent of the amount present. On a few occasions large variations would occur between readings from sprues taken from the same cast, but these were demonstratedly due to variation in composition of the iron. The results achieved are thought to be easily adequate for industrial control analysis.

This work was undertaken for, and supported by, the Department of Engineering Research of the University of Michigan, Ann Arbor, Mich.

1. *Journal* of Applied Physics, Vol. 8, No. 3, March 1937.
2. Report of Spectrographic Conference at Massachusetts Institute of Technology, 1937.
3. Michigan Technic, Vol. 19, No. 5, Feb., 1937. (Written by A. Waldchen.)
4. THE FOUNDRY, Vol. 65, No. 5, May, 1937. (Abstract of Technic article.)

Three Sets of Duplicate Analysis

Cast No.	Per cent Aluminum		Cast No.	Per cent Aluminum		Cast No.	Per cent Aluminum	
C43	3.07	3.09	D33	2.98	2.96	D43	3.20	3.25
C44	4.58	4.65	D34	3.86	3.93	D44	4.20	4.22
C45	5.05	4.93	D35	4.82	4.79	D45	4.75	4.82
C46	6.04	5.96	D36	5.46	5.38	D46	6.62	6.62
C47	6.97	7.02	D37	7.72	7.62	D47	6.04	6.17

Form Association

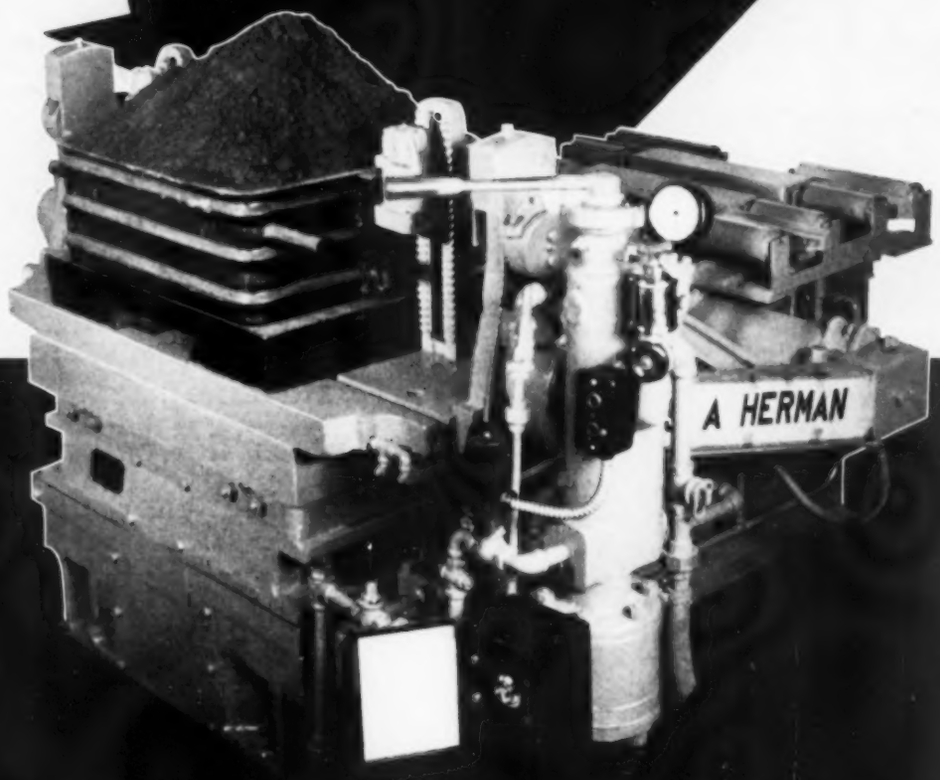
Representatives of 20 of the principal commercial laboratories of the country, at a meeting in Chicago recently, completed organization of the American Council of Commercial Laboratories. One of the purposes of the council will be the promotion of the proper use of scientific testing methods for the protection and certification of quality in advertised goods. Laboratories which are adjuncts of other enterprises, or which are not self-supporting, or which, for any reason are not independent are ineligible for membership in the council.

The following officers and members of an executive committee were elected to serve during 1938: President, Preston S. Millar, Electrical Testing Laboratories, New York; Vice President, Monroe L. Patzig, Patzig Testing Laboratories, Des Moines, Iowa; Secretary, D. E. Douty, United States Testing Co., Hoboken, N. J., and Treasurer, A. R. Ellis, Pittsburgh Testing Laboratory, Pittsburgh.

Members of executive committee are: James H. Herron, James H. Herron Co., Cleveland; F. B. Porter, Southwestern Laboratories, Fort Worth, Texas, and T. A. Wright, Lucius Pitkin Co., New York.

Linde Air Products Co., unit of Union Carbide and Carbon Corp., New York, has opened a new sales office at 3710 San Pablo avenue, Oakland, Calif. The office will serve the Oakland area, supplementing the San Francisco office.

SUPERIOR DESIGN GIVES YOU *Greater Value* IN THE NEW HERMAN MOLDING MACHINES



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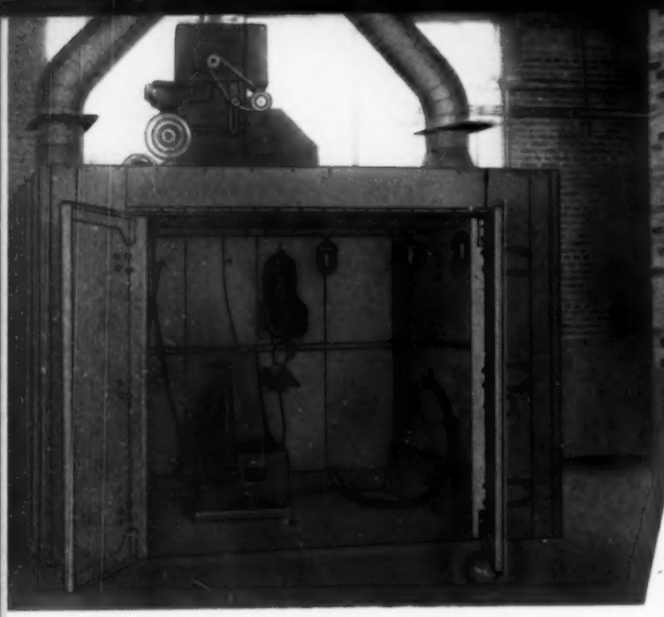
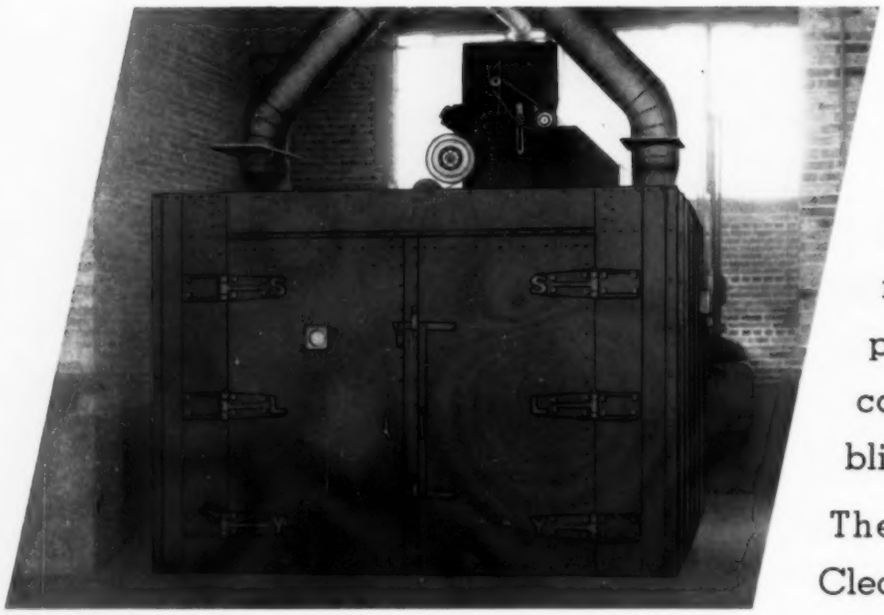


Sly Blast Room designed for cleaning miscellaneous gray iron castings in foundry.

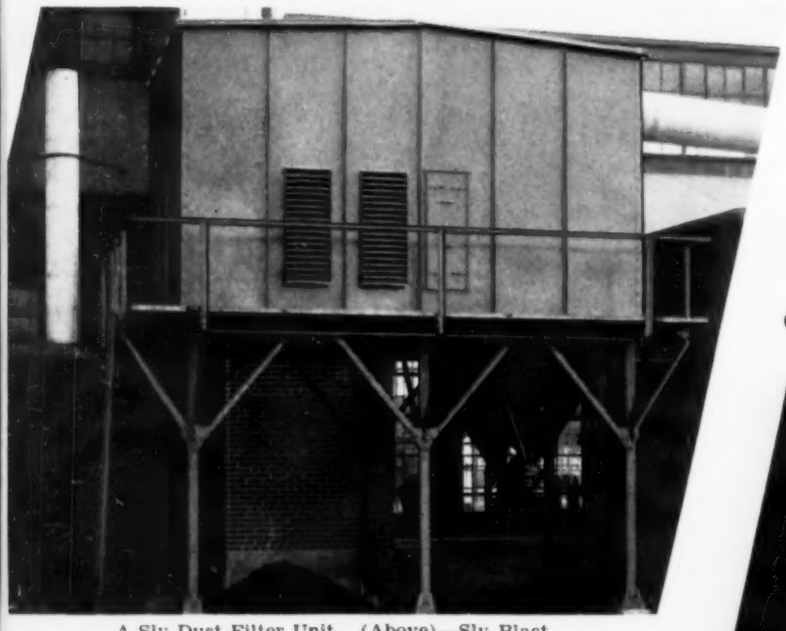
PUT *Speed* into that BLAST CLEANING JOB



• When the call comes for more castings for greater production – when the enameling department, machine shop, or your customers press down for more castings – consider the output of Sly Tumbling Mills and Blast Rooms.

The sturdy, efficient Sly Blast Cleaning equipment answers the call at low cost performance.

Let one of the Sly sales engineers survey your plant – prove to you that Blast Cleaning is something Sly does just a little better, and at lower cost.



A Sly Dust Filter Unit. (Above)—Sly Blast Room in operation showing doors closed.

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Looks like Igotcha got something

The Adventures of Bill

—by Pat Dwyer

AT ONE time or another," Bill remarked the other night, "I have read scientific papers or have heard them read. Some are good, some are so-so and some, like the birds, are entirely over my head. Here's one a friend of mine sent me recently with the request that I look it over carefully and then tell him what I thought of it. He claimed that the paper had appeared in *Nickel Steel Topics*. I looked it up in that publication and found that while he had told the truth, he had not told the complete truth. The copy he sent me had been expanded, and no doubt in his estimation, improved. It is complete with foot notes and everything and is titled *The Structure of the Nickel-Tripeum-Scattium-Alloys*, by Attaboi Igotcha[1] and Okidoki Hotchacha[2].

Specimens selected at random from a wide range of these alloys were rejected as usual by the WPA project for making three little pigs grow from where one was planted in the good old days of plowing them under and mowing them down. Ostensible reason for rejection was the failure of the specimens to stand up under the pig bristle test developed by Sazyu[3] and Oyeah[4]. Details of this test are so familiar that further reference is considered unnecessary. However, it is interesting to note—and the authors now are engaged on a second and supplementary paper on this phase of the subject—that quite conflicting results are secured depending on whether the test is conducted from the front in full daylight, or from the rear on a moonlight night. Preliminary studies on this subject are presented in those well known and standard references: *A Braw Bricht Moonlicht Nicht*, by R. R. R. Burrrns and *A Birdseye View of a Pig's Ankle by Moonlight*, by Huffer and Puffer.

Following rejection of the first set of specimens as outlined briefly in the preceding paragraph, a second set of specimens was secured by turning the rejected specimens end for end and upside down. A process known in the vulgar foundry vernacular as beating the devil around the stump, or, according to some authorities, around the bush.

Wear resistance, as measured by the pig bristle test was omitted in this series of tests partly because of the unfortunate results in the first instance, but principally because the crabby old janitor refused any further invasion on his chin. Said he did not mind contributing a tuft or two to the good cause, but enough was too much. He wasn't going to go around like no scalded cat for nobody. He wasn't no pig in a poke, and likewise and furthermore did they want him to tell them where they could go?

Although the pig bristle test was omitted, tests were conducted on visibility, density, plausibility, permeability, utility, futility, incompatibility and night life of the kitty. When the tests were completed[5] and set out properly in chart form it was found that the abscissa extended at right angles to the ordinates and therefore the square on the hypothenuse was out of plumb.

Just one of life's little tragedies

Incidentally and as a byproduct of the investigation of the structure of the nickel-tripeum-scattium alloys, this interesting phenomenon of a cockeyed square has been referred to Sinclair Lewis as a refutation of the claims advanced in a recent publication *It Can't Happen Here*. A fat lot he knows about it.

Results of the tests were not quite as satisfactory as one might desire. This does not reflect on the intrinsic composition of the materials or on the painstaking effort of the principals and laboratory assistants who conducted the tests under—at times—rather trying conditions. On several occasions afternoon tea had to be postponed for periods ranging from 10 to 30 minutes. Twice, with the ultimate goal almost in sight the supply of cigarets was exhausted and the work had to be abandoned temporarily while the junior hopped across to Slimy Ike's Place for a package, on tick.

In a second chart which unfortunately was not completed and therefore is not available for publication, the final results became so hopelessly confused with colored and dotted lines running in every direction that the investigators decided to ditch the whole thing and take a small beer instead. Mass of figures obtained was too great to be reduced to an understandable basis. Addition and subtraction presented no particular difficulty, but in the higher branches involving multiplication, the work had to be stopped and the men sent home. Either through miscalculation or a gross miscarriage of justice, it was found that none of the figures in the top line would cancel out with those in the lower line. What further could be done along that line? Your investigators, game as they make 'em, are scientists and not vulgar line buckers or bucker-uppers.

In a third series of tests the results were highly gratifying. These were run on pieces chiseled from the specimens rejected originally by the WPA project for making the three little pigs, etc. Remember? O, well, it does not matter.

Close agreement was found be-

tween the expansion of the crystal lattices and that of the specimens consisting of composite masses of tripeum investigated by Uraliar[6] and Don Beleevya[7] who carried out somewhat similar experiments on the campus of dear old Siwash when comparing the relative merits of the lattices and the lateral pass.

Addition of scattium to the nickel lattice apparently exercises a marked effect on the chemical and physical properties of the resulting alloy. Omitting for the moment detailed reference to the various phases, it is sufficient for present purpose to submit final conclusions, to wit, namely (a) We could not get any results and (b) if we had any results they could not be wangled or phenagled successfully to agree with any other results. Oi! Is that a headache.

No change in structure took place at the temperature of the magnetic transformation. This is considered significant if for no other reason than that it throws a certain measure of doubt on the standard axiom to the effect that a change is as good as a rest. Evidently where there is no change there can be no rest, or vice versa. What's the use of rest to a fella without a bit o' change—in his pocket? The face centered structure of the alloy under discussion, bare faced in this instance, persisted from room temperature, approximately 70 degrees Fahr. up to 800[8] degrees Cent.

In a 50-50 opinion, Attaboi dissenting, Hotchacha claims that he is disappointed in this showing. He had hoped that the self centered structure of a certain party, name given on request, would be altered, and how, by ultimate exposure to high temperature. Another important variable factor recently introduced may affect his pious expectation to a serious extent. If John Lewis arrives first at the place to which he cordially has been requested to go on many occasions, Hotchacha's pet enemy will have nothing to worry about. He will find the firemen on strike and the furnaces cold.

An ageing test of 15 months duration on an alloy containing 97.03 per cent scattium showed that no consistent change occurred in the lattice parameter over the entire period. In other words, if the foregoing is not plain enough, no ageing effect occurs. In this respect the phenomenon closely parallels the ancient sun standing feat of Joshua or the more modern feminine miracle of retaining the same age from 22 to 42 inclusive. Thorough investigation on the part of the authors tends to throw discredit on a scurrilous canard to the effect that Joshua was a moonshine and not a sun shine expert.

About this time Hotchacha disappeared from the laboratory, but as his comments and comparisons were becoming distinctly and odiously personal, the remaining investigation was continued without his so called aid.

Lattice parameters were measured at different temperatures. From the parameter-temperature relationships, curves were deduced, produced, papoosed and vamoosed, showing effect of temperature on coefficient of thermal expansion and on co-eds on date nights. Sudden rise in temperature shown at *O* on the curve *Y* indicates where the author burned the ends of the thumb, index and second fingers of the right hand while picking up a piece of the hot metal. Pointed ejaculation smacking more of anger and astonishment than piety raised the room temperature by 0.0000412 degrees Cent. If you want to convert this into degrees Fahrenhite, and if you can spell Fahrenhite without consulting the dictionary, why, go ahead, but confidentially it is not worth the trouble.

Taken as a whole—you can take 'em or leave 'em—the curves are slightly imperfect, but during the height of the baseball season they were instrumental in winning the pool for three successive weeks[9]. The curves are not in the money making class of May West's, but they show promise. Ignoring May for the moment it will be noted that at a certain point the temperature shot up, and then at a further increase of temperature remained constant. This is where the author broke the thermometer.

The thermal hysteresis effect also is clearly shown and has proved of inestimable assistance to the Bronx Zoological society in predetermining the time in, and the occasion on which the hyenas will laugh[10]. Values are given for the lattice parameters of the pure *d* and *y*-phase at different temperatures. However, for the present the author will refrain from dilating upon this subject for the simple reason that he knows nothing about it. If you know of any better reason, you can send the answer to the station to which you are listening.

In the *y* alloys it was observed that the maximum becomes rather more or less pronounced as the temperature is raised, and that with increase of temperature it is displayed in the direction of the *wy*. In the *d* alloys the form of the curves is opposite in direction. From this it was concluded that the crystal structure was of the order

$$\frac{x.\ dy}{dx} \quad \frac{\Sigma^3}{3}\left[\sqrt{\frac{3+m}{2}}\right]^{-3}$$

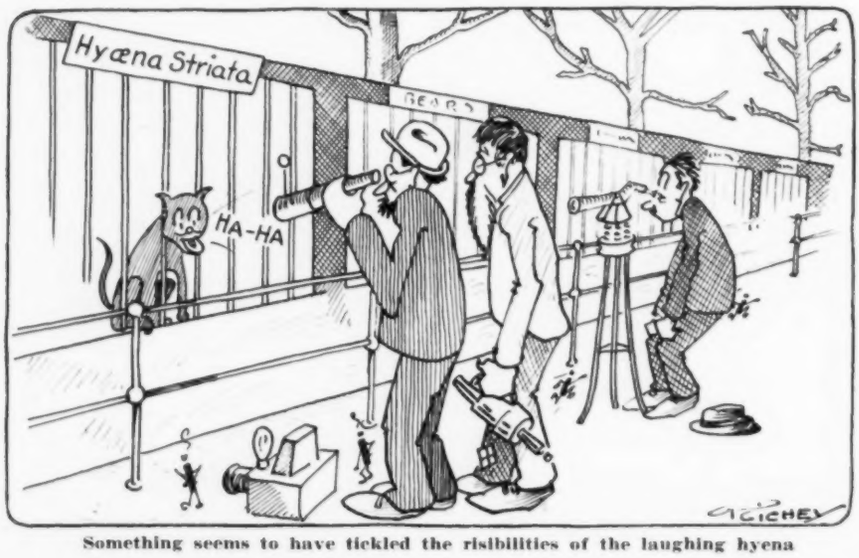
To check this result, further x-ray examination was made. A hard lump in the middle proved to be a new buffalo nickel, originally part of the content of Attaboi's small weasel skin change purse, but posted as missing coincident with the disappearance of Hotchacha. Further check showed a high percentage of carbon, tooth enamel and long finger nails. Sufficient evidence to warrant the happy conclusion that he had fallen, or had been pushed into the furnace. Net result of the entire investigation indicated the desirability of taking the work up again some time or other.

References: 1—General Manager, Ferro-Bolonium Corp. 2—Director of Research F. B. Corp. 3—F. A. Sazyu, Podunk University committee on Soporific Investigation, 1066 (et alia) 4—Clarence Oyeah, Soporific Investigation Committee, Muddleburg Technological Institute, 1937 (ad hoc) 5—Complaints file, B. C. 55—A. D. 1937 (not yet complete) 6—G. Uraliar Cf. *Trans.* Sing Sing Prison, 1899-1919. 7—I. Don Beleevya, Spaghetti a la Bolognaise, Pub. Tyrwhit and Tuwoo, $0.02 per copy. Op. cit. 8—800 C.—(32 + $\frac{800 \times 9}{5}$ F°—slightly warm (cf. Fr. hottern hail) 9—Extra copies $5.00. Apply to author. 10—Specially adapted this curve will give fair warning of feminine hysterics.

"Well," I said, "That is a truly remarkable document. What are you going to do about it?"

"I am going to wrap it up very carefully and send it back to the bird with the comment that I have perused it with the greatest interest and that in my humble opinion we are in for a hard, cold winter!"

National Bureau of Standards, Washington, has published a circular entitled, "Gallonage Tables for Horizontal Cylindrical Tanks with Flat Ends." Copies of the circular, which is No. C416, may be obtained from the superintendent of documents, Washington, for 5 cents.



Something seems to have tickled the risibilities of the laughing hyena

Sparks tell the ROYALITE Story

SPARKS **tell the U.S. ROYALITE high-speed story of costs going down! Sparks are the index of metal removed...in direct ratio to grinding wheel speed! Tough, long-lived U.S. ROYALITE high-speed wheels snag dead metal and dead costs...quicker! That's why they give you—**

SERVICE BEYOND PRICE AND SPECIFICATIONS

ROYALITE
GRINDING WHEELS

UNITED STATES RUBBER COMPANY
US
TRADE MARK

United States Rubber Company

United States Rubber Products, Inc., New York, N. Y.

VIEWING FOUNDRY DEVELOPMENTS AT SHORT RANGE

BUILDING up a new bottom in basic open-hearth furnace should be conducted slowly and with great care to insure a long campaign. One firm uses a mixture of 3 parts of double-burned magnesite and 1 part ground basic slag free from steel, to form the bottom. That material is put on in layers about ¼-inch thick, allowing about 2½ hours for sintering between layers in the first three inches of the bottom. Approximately 6 days are required to build the full bottom in a 30-ton furnace.

* * *

Generally speaking, about as much heat is lost by conduction through furnace walls and by radiation, as is usefully employed in heating the charge. Hence, by proper attenton to insulation, it is possible to effect a worthwhile saving.

* * *

Humidity of the atmosphere affects the moisture content of molding sand. It is reported that on days when the humidity is abnormally high, sand piles will average ½ per cent higher than normal.

* * *

A fireproof paint has been developed which it is claimed will give excellent protection against fire. Demonstration of the efficacy of the paint included setting on fire two small buildings, one painted, and the other not. The utreated house was a mass of flames in less than 4 minutes while the other showed scorched walls but the structure was intact. In another demonstration, furniture painted with the chemical did not burn. The chemical is applied like a primer coat of paint.

* * *

If steel heats are oxidized sufficiently to cause a vigorous boil, the residual silicon and aluminum will be eliminated or reduced to low values, and then if the heat is deoxidized properly before pouring, trouble from gas will be reduced to a minimum.

* * *

Use of copper sulphate for forming the background on metal sheets for scribing and layout work, can be eliminated by a new liquid which has been developed. It can be used on brass, aluminum, stainless steel, copper, tin and other metal surfaces. Applied with a soft cloth or brush, the liquid dries quickly.

* * *

ONE foundry finds that the most efficient method of adding clay binder to the sand heap is to remove part of the heap and mull it with the clay. That mixture then is spread over the heap, and the whole run through a sand cutter, aerator or other mixing device.

* * *

A succinct description of a foundry master mechanic states that he must be a man who never gets excited, knows what to do when a breakdown occurs, always has a new part ready to replace a broken one, and seems to have the faculty of knowing where to look for trouble.

* * *

Molybdenum is a carbide forming element, but less so than chromium. It also goes into solution in the ferrite, hardening and strengthening it. As little as 0.20 per cent molybdenum has increased the hardness of a completely annealed iron 30 brinell numbers while the microscope showed a structure of ferrite and graphite. Molybdenum also has a profound effect on graphite in cast iron, and causes it to precipitate out in smaller particles, more nearly nodular in shape.

* * *

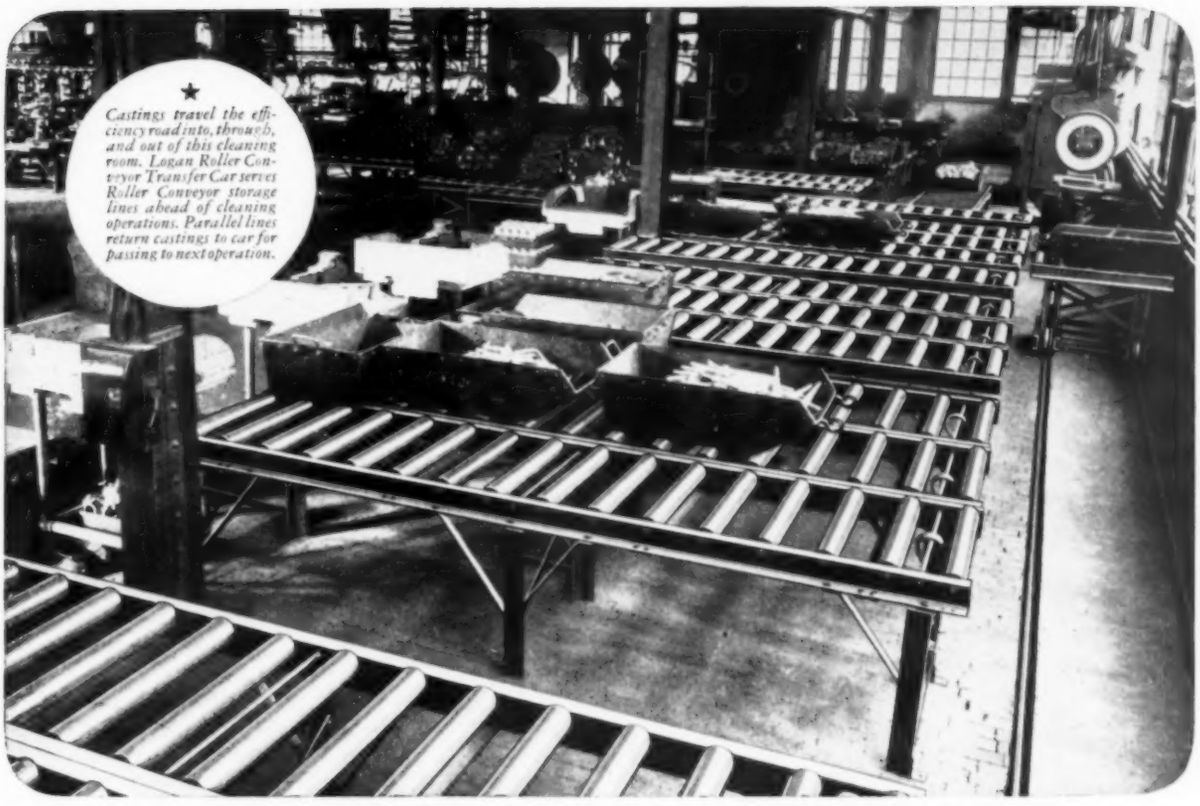
FREQUENTLY pinholes in castings are caused by an excess openness of molding sand tempered on the heavy side. The hot gases travel quickly through the open sand and convert the mechanically held water to steam at an explosive rate. That high temperature steam is trapped in the flow of metal as the advancing edge of metal rolls over the mold face.

* * *

Since the molding machine, sandslinger or other high speed unit is the heart of the foundry, it is there that the highest efficiency should be maintained. Spare parts, extra fittings, valves, bearings and even a spare unit should be on hand in case of a breakdown. Spare parts which are used should be replaced immediately so that they will be on hand.

* * *

A floor patching material has been developed for concrete floors which can be walked on in 2 to 3 hours, and will carry heavy trucks after 12 hours. It is mixed with water to the proper consistency for troweling, and is pressed into the holes which have been cleaned out.



★ *Castings travel the efficiency road into, through, and out of this cleaning room. Logan Roller Conveyor Transfer Car serves Roller Conveyor storage lines ahead of cleaning operations. Parallel lines return castings to car for passing to next operation.*

Are you getting there the "HARD WAY"?

★"What's the best road to Brownsville?", asks the motorist. And he chooses the shorter, smoother route, because it saves him time and expense. . . . Your foundry has been busy in the last twelve months. You have been "getting there" with production, but are you travelling the best road? . . . There are no detours in the foundry that is conveyorized at every possible operation, and there are many such operations. Logan Conveyors smooth out the way and make it shorter, faster and more profitable. They can do the same for you. . . . So if you have been busy, now is the time to equip with Conveyors wherever you can. A word from you and the nearest Logan engineer will be glad to call, or write on your letterhead for Bulletin 15.

Pouring station of a complete Logan flask handling system.

LOGAN CO., Incorporated, Louisville, Ky.
580 Buchanan St.

MOVING IS 90% OF MAKING

Logan Conveyors
LOUISVILLE

INTERNATIONAL

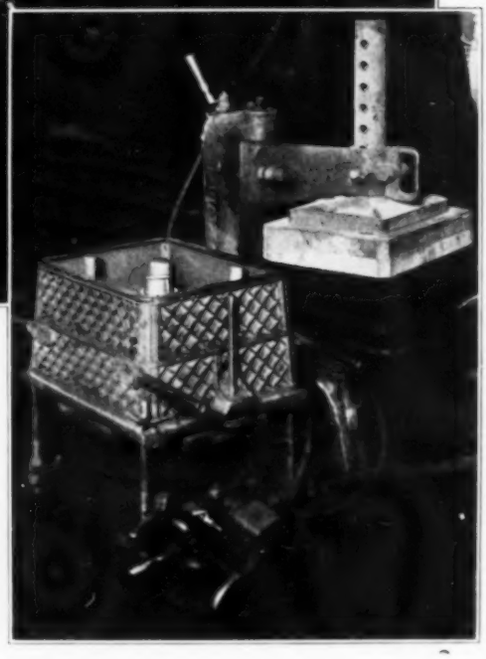
Type SB Blowers

which possess many original features are accomplishing what some foundrymen probably think are IMPOSSIBILITIES.

We build a complete line of sizes, ranging from our SB5 up to our SB16. Submit your BLOWING problems to us.

INTERNATIONAL
Type YPDL
Power
Pin Lift
Machines

are quickly rigged and speedily operated



INTERNATIONAL

Type PKL
Jolt Squeeze Strip Machines

have been designed especially for HIGH PRODUCTION work. Write for our No. 637 Circular in which these and many other types of INTERNATIONAL machines are shown under operating conditions.

INTERNATIONAL
MOLDING MACHINE CO.

2608-2624 W. 16th St. **Chicago, Ills.**

Chapter to Consider Equipment

The Jan. 13, 1938 meeting of the Northeastern Ohio Chapter of the American Foundrymen's association is to be given over to a consideration of the equipment question. The meeting will take place at the Cleveland club, Cleveland, and will start with the customary dinner at 6:15 P. M.

Arthur J. Tuscany, executive secretary of the Foundry Equipment Manufacturers association, Cleveland, has been delegated by the chapter to prepare the program and secure qualified speakers. The speakers will devote their efforts to describing new and interesting developments in the equipment field and will refrain from presenting sales arguments or comparisons with other equipment. Each speaker will be allotted a short period of time and some will employ lantern slides and moving pictures and other helps in presenting their message.

Following the presentations by the speakers, a question and answer period will be provided, during which anyone attending the meeting will be privileged to submit questions to be handled by any of the speakers. The chapter is looking forward to a very interesting meeting.

Lighting Problems

Engineering Experiment station, University of Illinois, Urbana, Ill., has published a circular No. 29 entitled "Problems in Building Illumination," by John O. Kraehenbuehl. The circular, which contains 28 pages, is divided into five parts including the introduction, factors involved in seeing, illumination, specific problems in illumination, and a summary. In addition a bibliography relating to the subject is included. Copies of the circular may be obtained from the Engineering Experiment station, Urbana, Ill., for 35 cents.

Book Review

Zero to Eighty, by E. F. Northrup writing under the name Dr. Pseudoman, 282 pages, published by the Scientific Publishing Co., Princeton N. J., and supplied by THE FOUNDRY, Cleveland, for $3.00 and in Europe by the Penton Publishing Co. Ltd., London.

This interesting book is of special interest to many in the foundry industry since the work of the author, Dr. Northrup, is known to foundrymen. It is interesting also to note that the book is dedicated to Dr. Guilliam H. Clamer.

The story deals with a trip which the author makes to the moon. It is written as an imaginative autobiography in which the author discloses his work in connection with electric guns, and presents other data including his solution of the problem of escaping the earth's gravitational attraction and navigating projectile ships in celestial space.

To make the presentation more interesting, Dr. Northrup has separated the general description of the activities of Akkad Pseudoman from the technical facts, proofs, and scientific information. The latter has been placed in a technical supplement so that the autobiographical narrative may be read consecutively. The author points out that while the narrative is pure fiction, written to present a far-reaching technical matter, it is free from the fanciful. The scientific work has been done in considerable detail, and is believed to be entirely consonant with current proved facts and well-tested technical knowledge.

Faked Foundry Facts

"Snag Grinding"

Glare Reducer

Skybryte Co., Cleveland, has developed a new product which is applied to windows to reduce excessive glare experienced during winter months in buildings adjacent to open fields where large expanses of snow are present. The product is a pale green, adhesive liquid that can be brushed or sprayed upon the windows. It is claimed that it admits over 90 per cent of the light which is reduced to a mellow, softly diffused illumination. The product is applied to the inside or outside of the window and remains on the glass until removed with hot water and a stiff bristle brush.

Walking backward with loads is a dangerous practice, and it is particularly so in restricted areas.

Discuss Wages Bill

Representatives of foundries in Southern Ohio, Southeastern Indiana, and Northern Kentucky held a meeting in Hamilton, O., on Nov. 8, and went on record as opposing the Black-Connery wage bill. A committee of five appointed by Peter E. Rentschler, Hamilton Foundry & Machine Co., Hamilton, and president of the Gray Iron Founders Society Inc., Cleveland, drew up a resolution containing objections which later were presented to various senators and congressmen. The committee consisted of Walter A. Rentschler, Hamilton Foundry & Machine Co., Hamilton, O.; Chester A. Peebles, Stedman's Foundry & Machine Works, Aurora, Ind.; A. H. Kramer, Advance Foundry Co., Dayton, O.; Raymond J. Redmond, Buckeye Foundry Co., Cincinnati, and Earl H. Thompson, H. F. Deuscher Co., Hamilton.

W. W. Rose, executive vice president, Gray Iron Founders society, discussed the Black-Connery bill and pointed out the effect its passage would have on the foundry industry. A similar meeting was held in Cleveland on Nov. 15 at which Walter L. Seelbach, Forest City Foundries Co., Cleveland, presided.

Reveals Flaws

A method of inspecting machine parts for hidden flaws without injuring or changing them has been developed by the General Electric Co., Schenectady, N. Y. It depends on the principle that any substantial change in the constitution or state of magnetizable material will be reflected in its magnetic characteristics. Magnetic search coils mounted close to the external surface of the part, exert a constant magnetic field which penetrates through the entire thickness of a small area of the part to be inspected. During inspection the part is revolved slowly to change continuously the section within the field, until the whole part is explored magnetically. Any sudden change in the magnetic linkage, created by a discontinuity in the metal of the part, such as voids or nonhomogeneous areas in the interior, produces a corresponding sudden electric voltage in the external measuring circuit. The imperfection is detected and the defective part is discarded.

Exercise Care

Care should be exercised in piling and blocking materials so that they will not roll or slide, and so that they will furnish proper handhold when necessary to be rehandled.

OBITUARY

JOSEPH B. DEISCHER for the past 8 years manager of the Columbia Malleable Iron Co., Columbia, Pa., died Nov. 23. Mr. Deischer was born at Daggers Springs, Va., Feb. 14, 1888. He was educated in the public schools and at the National Business college, Roanoke, Va. In 1907—1909 he was secretary to J. E. Johnson, manager of the Princess Furnace Co., Glen Wilton, Va. He then joined the Symington Co., Rochester, N. Y., and after serving in all departments became assistant superintendent. From 1923 to 1927 he was assistant to the consulting engineer American Malleable Castings association and Malleable Iron Research institute. In 1927 he was sent to Europe by the American Radiator Co., as consulting engineer in the company's malleable iron foundry near Paris, France. Returning to this country he was engaged for some time as an independent foundry consultant. In 1929 he returned to the Malleable Iron Research institute and in November of that year he became connected as works manager of the new plant erected by the Columbia Malleable Iron Co., Columbia, Pa. He was one of the pioneers in the use of pulverized coal in the air furnace and took an active part in the development of this method of melting. He served on several committees of the American Foundrymen's association and was representative for the malleable division on advisory committee to the bureau of standards, United States department of commerce.

• • •

A. N. Myers, 75, first vice president, F. H. Myers & Bros. Co., Ashland, O., died recently in Cleveland.

• • •

Archibald H. Coplan, president, Hull Iron & Steel Foundries Ltd., Hull, Quebec, Canada, died November 19.

• • •

Emanuel Hribal, 73, owner, International Foundry, Cleveland, died Nov. 12.

• • •

J. G. Jennings, 81, vice president, Johnston & Jennings Co., Cleveland, and chairman of the board of the Lamson & Sessions Co., Cleveland, died en route to Florida where he planned to spend the winter.

• • •

I. H. Barbee, manager of the Atlantic plant, Link-Belt Co., died Nov. 4 in a Philadelphia hospital after a 6-weeks illness. Mr. Barbee was a native of Tennessee and received his early education in that state. He was graduated from Purdue university in 1908 as a bachelor of science in mechanical engineering. During the past 25 years he had been connected with the Link-Belt Co. at its Chicago, Philadelphia, and Atlanta plants.

• • •

Frank C. Sprague, 86, one of the first employes of the National Malleable & Steel Castings Co., Cleveland, died Nov. 19 at his home. Mr. Sprague retired 4 years ago after working for the company for 37 years.

• • •

Percy C. Brooks, 65, former executive vice president, Fairbanks, Morse & Co., Chicago, died October 15. Mr. Brooks started his business career with the Atlanta Machine Works, following graduation from Georgia School of Technology in 1891. In 1898 he began nearly 40 years' association with the Fairbanks organization.

Joseph B. Deischer

• • •

Chester D. Sensenich, president, Irwin Foundry & Mine Car Co., Irwin, Pa., and an official of the Byerly Gas Coal Co., and the Intrastate Coal & Coke Co., died Nov. 10 at his home in Irwin. He had been prominent in politics, serving as a Pennsylvania state senator from 1912 to 1916. Mr. Sensenich was born in Chester county, Pa.

• • •

H. Lamson Scovill, 56, director of the Scovill Mfg. Co., Waterbury, Conn., which was founded by his grand father, James Mitchell Lamson Scovill, died at his home in Madison, N. J., recently. He also was president of the Oiljak Mfg. Co. of Montclair, N. J.

• • •

G. F. Richmond, 48, manager of the Toronto branch of the Canadian Car & Foundry Co. Ltd., died recently. Mr. Richmond had been associated with steel foundries in Cleveland and Chicago before joining the Canadian organization in 1917.

• • •

A. E. Kayes, 54, superintendent of the refinery plant, International Nickel Co., Huntington, W. Va. since 1923, died recently. His associates credited him with the development of more nonferrous alloys than any other man in the United States and for much of the progress in the practice of metal refining by the use of the electric furnace. Mr. Kayes was the second president of the Electric Metal Makers guild.

• • •

Alfred H. Gawthrop, district manager, American Car & Foundry Co., Wilmington, Del., died recently. Mr. Gawthrop was a native of Wilmington and attended Friends' school in that city and Drexel institute, Philadelphia. For 5 years he was employed in the firm of Gawthrop & Bros. Co. and then went with the American Car & Foundry Co., starting as a mechanic. He later became assistant manager and then district manager.

• • •

Robert B. Carolin, Sr., who established the R. B. Carolin Foundry, Detroit, in 1912, died Nov. 20 at his home in Detroit. Carolin was born in 1871 and was educated in the public schools of Detroit. After being associated with Detroit Lubricator Co. and Clayton & Lambert Mfg. Co. he established his own company. He was an organizer and past president of the Detroit Foundrymen's association, now the Detroit chapter of the American Foundrymen's association.

• • •

Benjamin Lissberger, 62, chairman of the board, Federated Metals division of the American Smelting & Refining Co., New York, died Friday, Nov. 19, following a short illness. He was a prominent figure in the secondary metals trade for many years and had a wide acquaintance throughout the industry. Mr. Lissberger was associated with the Federated Metals Co. for many years before its merger with the American Smelting & Refining Co. in 1932.

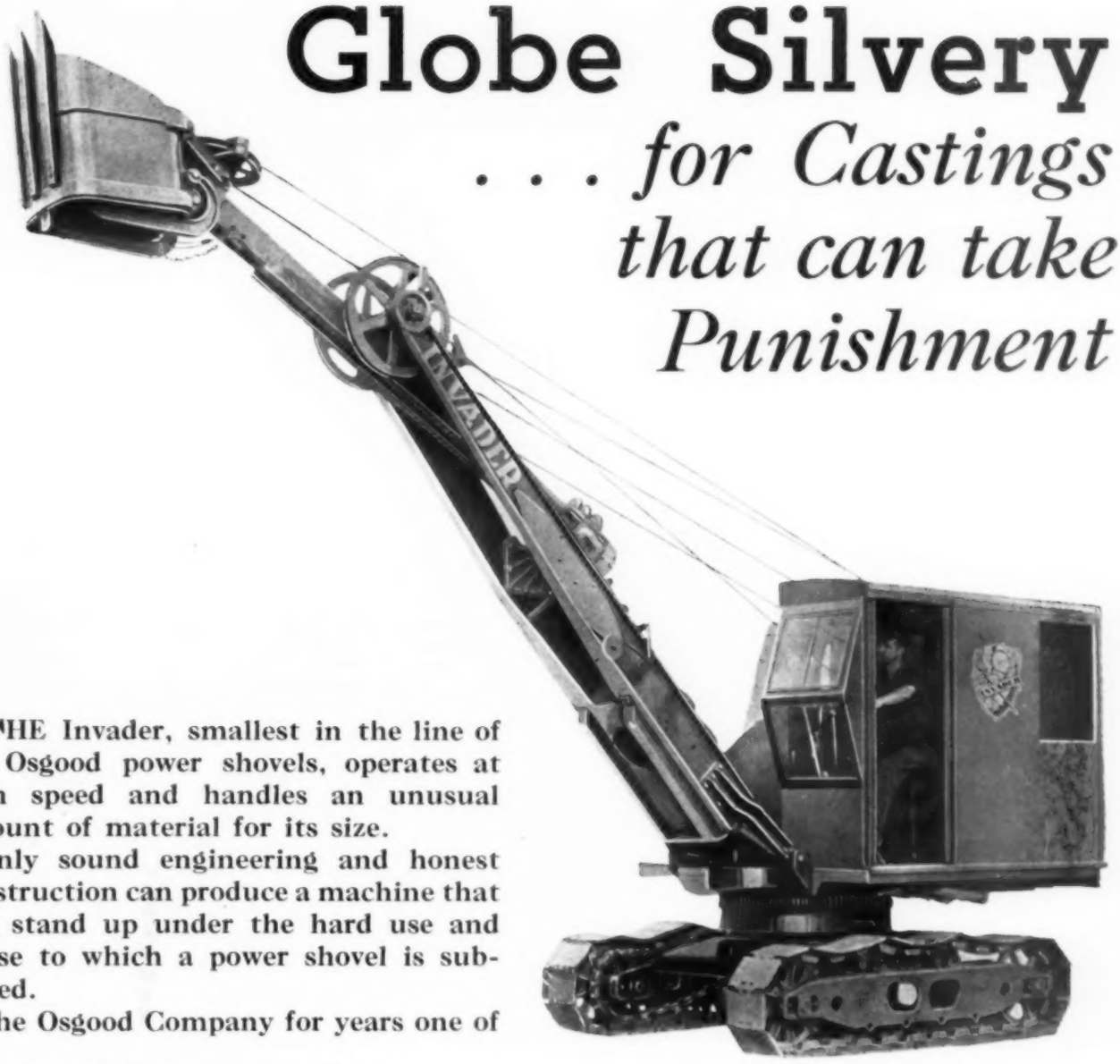
• • •

Bernard A. Fuller Sr., 68, president and treasurer, Hercules Mfg. Co., Centerville, Iowa, died at the State University hospital, Iowa City, Iowa, Oct. 26. Mr.

(*Concluded on page* 74)

Globe Silvery

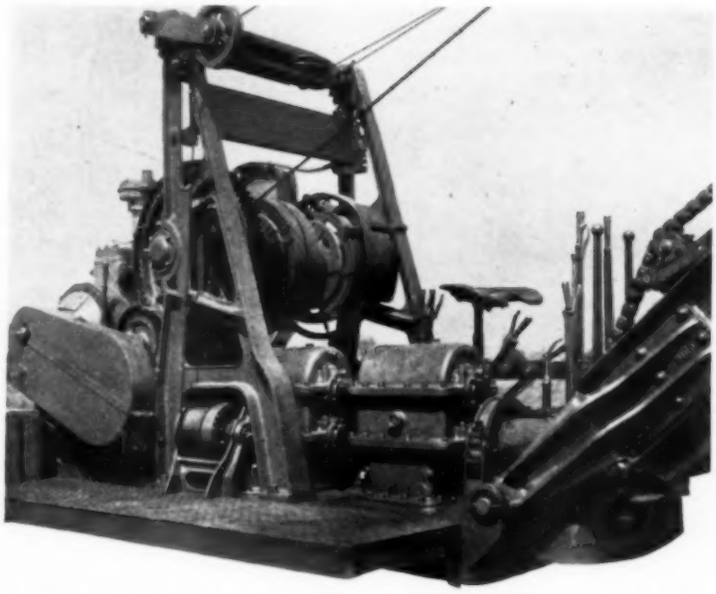
. . . *for Castings that can take Punishment*



THE Invader, smallest in the line of Osgood power shovels, operates at high speed and handles an unusual amount of material for its size.

Only sound engineering and honest construction can produce a machine that will stand up under the hard use and abuse to which a power shovel is subjected.

The Osgood Company for years one of the leaders in manufacturing this type of equipment, uses castings for vital parts of their machines. This company has standardized on Globe products for making quality castings; castings that must meet exacting service requirements. Globe Silvery Iron is used for the high strength grey iron castings and Globe Low Phos for the alloy steel castings.



The Invader, with cab removed, showing the many high strength iron and steel castings used in construction. All castings made with Globe Silvery or Globe Low Phos Iron.

Globe products are widely used for castings that must meet severe service requirements.

We will be glad to tell you how.

GLOBE IRON COMPANY
JACKSON, OHIO

(*Concluded from page* 72)

Fuller was born in Muscatine, Iowa on Feb. 28, 1869 and at the age of 15 entered the iron foundry as an apprentice. After finishing his apprenticeship, he worked in foundries at Davenport, Chicago, Kansas City and the government arsenal at Rock Island, before going to Centerville to form a partnership with Miles Bateman to establish a foundry. Later he purchased Mr. Bateman's holdings and after association with several other men, joined with Mr. Bateman again to form the Hercules Mfg. Co. Mr. Fuller was president and treasurer of that organization since its reorganization in 1912. He was active in numerous civic enterprises and was one of the organizers of the Centerville chapter of the Kiwanis club.

Reader's Comment

EDITOR'S NOTE—*Material Appearing Under this Head Does Not Necessarily Reflect the Opinion of The Foundry or of Its Editors.*

Improved

TO THE EDITORS:

As a constant reader of THE FOUNDRY since the first issue, and as an occasional contributor over a period of many years I thought you might be interested in knowing that I consider the magazine has improved to a considerable extent in the past year or two. I am now entering my 89th year and as you know have not been connected with the foundry industry in an active capacity for many years, but I am still keenly interested in the progress of the industry and the many developments in methods, materials and equipment as set forth in the pages of THE FOUNDRY.

ROBERT E. MASTERS

4045 *Eagle street*
San Diego, Calif.

More Information

TO THE EDITOR:

The article by E. Bremer, "Automotive Malleable Castings Made on Continuous Molding Units" appearing in the October issue of THE FOUNDRY invites the following comments:

Mr. Bremer's narrative seems to have for its objective the intent to impress upon the reader the fact that there is in existence an ultra-mechanized production scheme which permits the complete elimination of the human element and reduces a mind-possessing workman to a button-pressing robot. Pity the foundryman who makes the mistake of hiring one of these automaton molders. While his scant description of such an engineering feat will leave one with due admiration for engineering genius, the value of this publicized information in a trade magazine must rightly be questioned as it fails to enlighten the reader in regard to pertinent data. For example, there is stated that the cupolas employed are charged with 10,000-pound metal charges of a given composition—an unusual charge as to size—yet no mention of the lining diameter is given.

A coke ratio of approximately 1 to 9, and a metal temperature at the spout of 2800 degrees Fahr. is claimed. However, reference to the height of coke bed, etc. is omitted. A rather unusual high melting rate of 25 tons per hour for one cupola is mentioned, which again produces a question of cupola diameter. From the data submitted, one would be justified to assume that a cupola of at least 72-inches diameter is employed. Considering the component bulky parts of those charges, the depth of such a metal charge calls for an explanation in reference to the height of melting zone obtained. Twenty-eight hundred degrees Fahr. is considered a pouring temperature of white iron. Elongation of 3 tons of this metal to 2850 degrees Fahr. by means of an electric furnace within 4 minutes opens up a series of questions concerning cost.

Resting upon just these few quotations, the merit of Mr. Bremer's publication is to be questioned providing he will give his fellow foundrymen supplementary data in a subsequent article.

F. J. WURSCHER

Pottstown, Pa.

The latest available information relating to those cupola operations is as follows: The cupolas have 102-inch shell diameters, which are lined down to 66 inches at the bosh, and the bosh is about 30 inches high. The remainder of the cupola is lined down to 78 inches. The height of the coke bed at the start in the morning, is 60 inches above the tuyeres. Height of the melting zone is believed to be about the same as the bosh, which is about 30 inches.

Present charges consist of 45 per cent sprues, 45 per cent steel (baled sheet bundles weighing from 50 to 200 pounds each) and 10 per cent silvery pig iron. The cupola charges weigh 10,000 pounds each and 1200 pound coke splits are used between charges. A melting rate of 50 to 55 tons per hour on two cupolas is maintained for 16 to 18 hours depending on the length of the shifts which are operated.

Temperature of the iron at the spout runs from 2820 to 2880 degrees Fahr. and little difficulty is encountered in maintaining an average of 2840 to 2850 degrees Fahr. Cupola metal is superheated in two electric furnaces to 2850 degrees Fahr.

THE EDITORS

Book Review

Iron and Steel Castings at the Sixth Foundry Exhibition, by E. Piwowarsky, 165 pages, cloth, 8¼ x 11¾, published by Giesserei-Verlag, Duesseldorf, Germany, and supplied by THE FOUNDRY, Cleveland, and in Europe by the Penton Publishing Co. Ltd., London.

This volume, which is in German, illustrates in a brief concise manner the present position of research and scientific knowledge as well as the present position of technology and metallurgical practice in the foundry field as exemplified by the scientific section of the International Foundry congress held in Duesseldorf during September, 1936. The book is divided into six principal sections devoted to various phases of which the first is the technical and politico-economic importance of the foundry industry.

The second section constituting the major portion of the volume discusses cast iron under 32 subheadings relating to a variety of considerations such as development and standardization, mechanical and physical properties, raw materials, structure and graphite formation, melting, molding sand, alloying, etc. Chapter III is concerned with malleable cast iron while Chapter IV describes chilled cast iron and cast iron rolls. Steel castings are discussed in Chapter V, and Chapter VI is a bibliography of literature. Numerous charts, tables and illustrations are included to amplify the text matter.

Safety Congress

The 1938 National Safety congress will be held at the Stevens hotel, Chicago, Oct. 10-14, 1938, according to a recent announcement of the executive committee of the National Safety conucil. The 1938 meeting will be the silver jubilee year of that organization.

Heavy Duty Type II-F Jolt Squeeze Molding Machine Built Stationary or Portable

ORIGINAL IN DESIGN • SIMPLEST IN OPERATION

STURDIEST IN CONSTRUCTION

Suggestions for making your comparisons of Design and Construction

1. Long Cylinders and Pistons.

2. The long round pistons and parts assure longer life, better alignment and greater rigidity. Guide pins and bushings are hardened and ground.

3. The bulk of the weight is in the base and lower parts of the machine which is subject to the greatest wear and tear from strain and vibration caused by jolting.

4. The upright is a double extra heavy tubing with a large margin of safety to withstand at least fifty (50%) percent more strain than it is subjected to. It also serves as an air reservoir at the machine and a water and oil trap.

5. The air supply is piped in on top of this column therefore eliminating this piping or hose at the floor line.

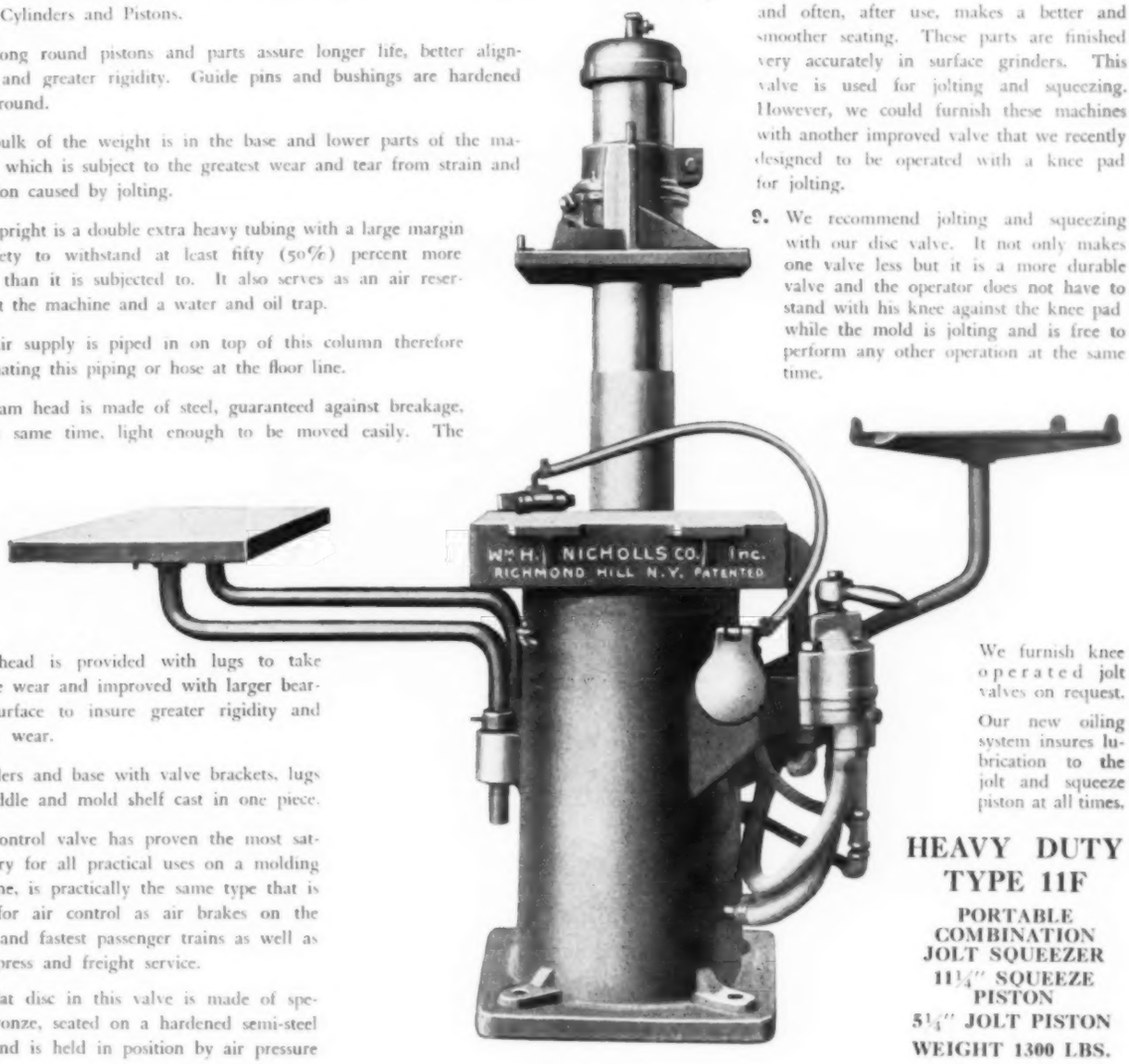
6. The ram head is made of steel, guaranteed against breakage, at the same time, light enough to be moved easily. The ram head is provided with lugs to take up the wear and improved with larger bearing surface to insure greater rigidity and longer wear.

7. Cylinders and base with valve brackets, lugs for riddle and mold shelf cast in one piece.

8. The control valve has proven the most satisfactory for all practical uses on a molding machine, is practically the same type that is used for air control as air brakes on the finest and fastest passenger trains as well as on express and freight service.

The flat disc in this valve is made of special bronze, seated on a hardened semi-steel base and is held in position by air pressure and often, after use, makes a better and smoother seating. These parts are finished very accurately in surface grinders. This valve is used for jolting and squeezing. However, we could furnish these machines with another improved valve that we recently designed to be operated with a knee pad for jolting.

9. We recommend jolting and squeezing with our disc valve. It not only makes one valve less but it is a more durable valve and the operator does not have to stand with his knee against the knee pad while the mold is jolting and is free to perform any other operation at the same time.



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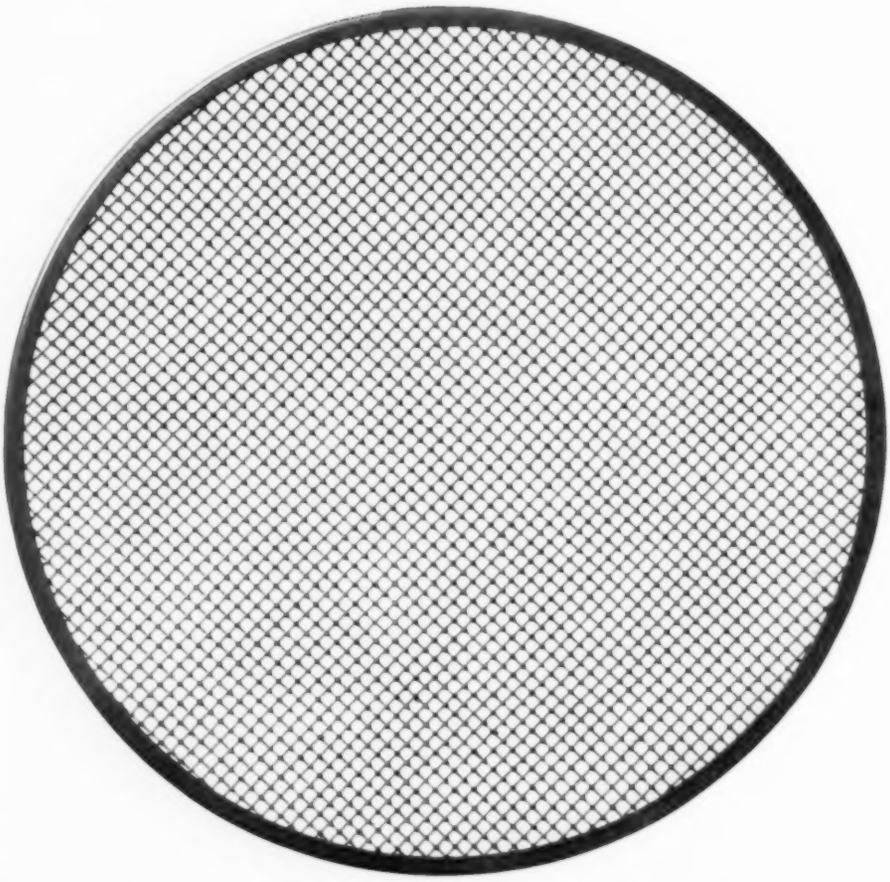

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Makes Pressure Castings

(*Concluded from page* 28)

are to place and shift the weights on the molds, remove the castings from the molds and to riddle or screen the sand. Each molding floor has its own pneumatically operated, shaking riddle. Pouring is performed by a gang of three men, two of whom handle the ladle while the third skims the molten metal.

For the past 6 or 7 years, the only sand added to the molding sand used in the foundry is that formed from a mixture of 50 per cent screened foundry floor sweepings, and 50 per cent new Ohio Bremen No. 1 molding sand which is sufficiently high in clay or bond content to provide proper bonding in the final mixture. The sweepings used are those obtained from the foundry floors at the end of each shakeout. That material is taken to a vibrating screening device shown in Fig. 6, which as may be observed consists of two screens placed one above the other. The top screen is 12-mesh and it serves as a scalping screen, removing any metal and coarse material. Sand falls on and through a 30-mesh screen just below the 12-mesh screen. Material retained on the 30-mesh screen is sent to the smelting department. The sand which falls through the screen is sent to the sand blending department. The sand screening chamber is totally enclosed and attached to an exhaust system which not only removes dust, but also practically all the fines so that no trouble is encountered from that source.

That department, as shown in Fig. 7, contains a batch type sand muller made by the National Engineering Co., Chicago, and a sand separator and blender manufactured by the Royer Foundry & Machine Co., Kingston, Pa. The screened floor sweepings are mixed half and half with new molding sand, mulled, and then passed through the separator and blender. The resulting sand is added to the regular floor heaps as make-up sand, and usually at least one wheelbarrow load is added per day; part being added at each shakeout.

Sand Tested Once a Week

Average grain size of the sand, determined according to the A. F. A. method of classification, is 190. The permeability ranges from 12 to 17, and the green compressive strength from 6 to 7 pounds per square inch. Moisture content is about 6 per cent. While the heaps are tested only once a week for permeability, strength and moisture, it has been found that more frequent testing is not necessary because the same grade of new sand has been obtained from the same source for a number of years, and variations in permeability and strength are extremely small. Moisture, of course, is controlled in blending and in tempering the sand.

Cores used in the foundry are made from a mixture of 60 per cent Lake sand and 40 per cent bank sand which is bonded with linseed oil in the ratio of 1 part oil to 65 parts of sand. Mixing is performed in a paddle type mixer. Cores are made by hand and on a core blowing machine supplied by William Demmler & Bros., Kewanee, Ill. They are baked in 6-drawer type, oil-fired core ovens made by the Foundry Equipment Co., Cleveland. A view of the core room is shown in Fig. 5.

Castings shaken out from the molds are placed in wheelbarrows and conveyed to the cleaning room where the excess sand is removed by vibration supplied by forcing an ordinary pneumatic hammer against the gate of the castings. That is done while the castings still are in the wheelbarrow, and consequently, the sand falls to the bottom. After the sand is removed from the castings, the gates and runners are removed on sprue cutters or on a band saw; the method depending on the thickness of the gate and the intricacy of the casting. Then the castings are snagged on grinding wheels to remove any slight projections. That is followed by sandblasting to obtain a good smooth surface. Sandblast barrels made by the Pangborn Corp., Hagerstown, Md., New Haven Sand Blast Co., New Haven, Conn., and the Standard Equipment Co., New Haven, are used for the work. Two hand-type vertical sandblast machines made by the Paxson-Warren Co., Philadelphia, are used for special castings which are handled in barrels.

National bureau of standards, Washington, has published Research Paper RP1030, entitled, "Deformation and Young's Modulus of Fireclay Brick in Flexure at 1220 degrees Cent.," by Raymond A. Heindl and William L. Pendergast. Copies of the paper may be secured from the superintendent of documents, Washington, for 10 cents.

Fig. 6—In this double screen the shakeout sand is separated from any metallic content.

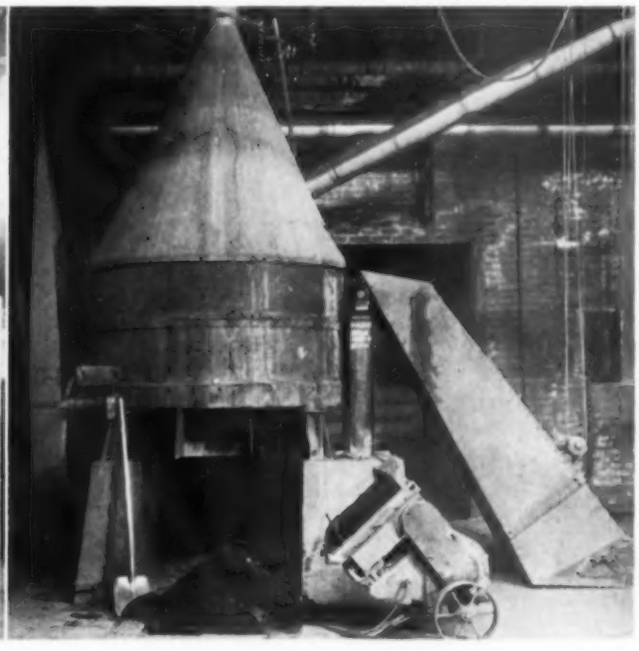

Fig. 7—Sand to be added is mulled and then aerated

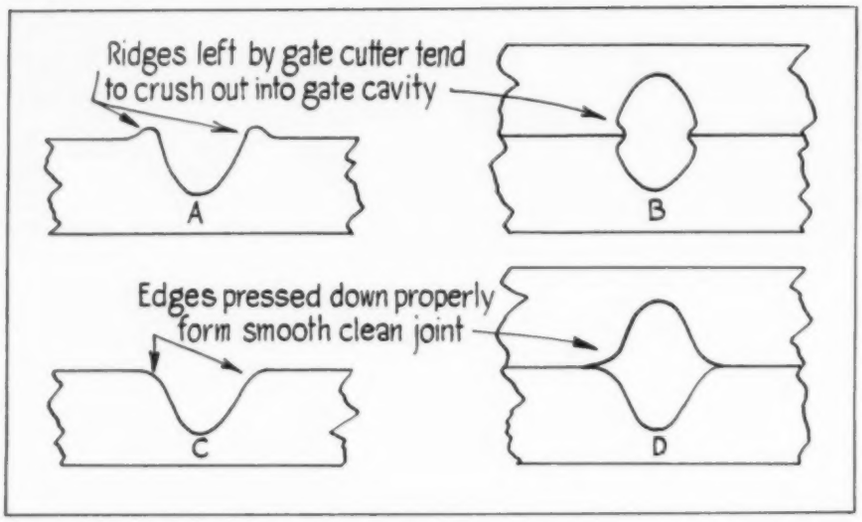

Fig. 3—Careless cutting of gate without finishing may result in dirty castings

Gating Nonferrous Castings

(*Continued from page* 29)

cavity is preferable to the maximum number. Since these alloys set rather suddenly, the size of the gate between the riser and the casting should be adequate to prevent freezing before feeding is completed by the riser.

Where heavy castings, or castings with heavy sections are to be made of these alloys, it is desirable to have the gates, runners, and sprues well coated with plumbago or graphite well rubbed in. The heavy pressure due to the higher specific gravity of the alloy tends to force the metal into the sand, particularly at sharp corners. In all gates and junction of gates with casting every sharp corner should be removed.

Gate Castings at Bottom

While gating for each of these alloys is somewhat different from others of the group, the fundamental principles are much the same. Desirability of quiet flow of metal into the mold is quite as imperative in one case as in any other. In some of the manganese bronzes, heavy shrinkage is not as great as in others. Therefore, the size of the risers does not have to be quite so great. Since the pouring temperature of these alloys is much lower than it is in alloys having a higher copper content, the burning effect upon the molding materials is not so intense.

In the first principal fundamental of these alloys it is best to introduce the metal at the bottom of the mold so that the mold may fill quietly without having a Niagara Falls within the mold cavity. Agitation of these alloys during the pouring is not only undesirable but is the source of many defective and rejected castings. Gushing or spraying of the metal into the mold must be avoided. All gates should be designed to prevent any such occurrence at any state of the pouring or at any point in the entire route of the metal from the sprue to the mold cavity itself. Attempts have been made to pour manganese bronze castings by dropping metal from the top of the mold cavity to the bottom, through what commonly is known as a spray gate. A few attempts resulted in castings that were accepted but with considerable doubt as to their desirability and with a definite knowledge that they showed defective surfaces before machining and a definite suspicion that the metal was not solid throughout its entire section. Since the cost of these castings was high it was not desirable to destroy them to find out how badly they were defective within their section. Therefore, it never has been known just how many blowholes or other defects were included in the castings that finally were passed. However, rejected castings, upon being examined by fracturing, showed definite defects that proved the inadvisability of this method of gating for these alloys.

First Metal Forms Well

Where a long sprue is necessary to lead the metal from the top of the mold to the parting, provision should be made to avoid carrying the first metal into the mold. One method is to have a sump or projection on the bottom end of this sprue. The first metal forms a well to cushion the effect of the downward flow of the metal as it passes from the sprue to the runner and thence to the gates and castings. Proper restriction should be provided to insure a quiet flow of metal through all runners and gates to the mold cavity. As in the previous instances, the best restriction or valve for this purpose is that of choosing the right sized sprue and maintaining it completely filled throughout the entire pouring period.

Where large castings are to be made for example in manganese bronze, it frequently will be found desirable to place a pouring basin of adequate size on top of the mold to supply metal to the sprue. At the mouth of the sprue provision is made for the insertion of a plug. The sprue may be plugged until the pouring basin is filled to a predetermined level, after which the plug is pulled and the metal entering the mold comes from the bottom of the bath of metal in the pouring basin. The pouring basin carefully is kept at the predetermined level by pouring a sufficient volume of metal into it during the entire time that the metal is passing out of it down the sprue to the mold cavity. This method of gating sometimes is known as bottom pouring, the French method of gating, etc. It has the advantage of permitting the scum or slag to rise to the surface of the bath of metal in the pouring basin. If properly done only the cleaner metal in the bottom of the pouring basin enters the mold. It prevents the slag on top of the bath from entering the mold cavity.

Avoid Nozzle Effect

Care should be taken with this method of gating to avoid all possible erosion by the passage of metal from the ladle into the pouring basin, by the passage of the metal from the pouring basin or sprue, or through the sprue, runner and the gates to the mold.

Even with bottom pouring a blind end should be provided at the bottom of a long sprue so that any dirt or dross carried down by the first metal will be trapped in the blind end.

Where horn gates bring the metal into the mold cavity at the bottom, proper restriction by the correct size of sprue should be considered carefully. The flow out of the horn gate into the castings should be quiet and not a gushing stream, or with any tendency toward a nozzle effect, as indicated in Fig. 2. This is particularly important in alloys containing aluminum where the agitation of the metal produces aluminum oxide and consequently a slag. In aluminum bronze, the metal always is enveloped in an aluminum oxide film. To break this film means trouble. The more quietly the metal enters the mold, the surer we are that the film is unbroken. Where two or more streams of

(*Concluded on page* 80)

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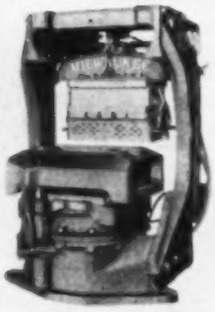

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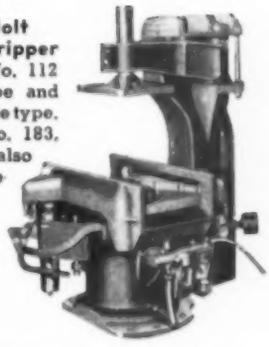

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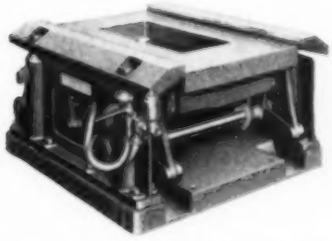

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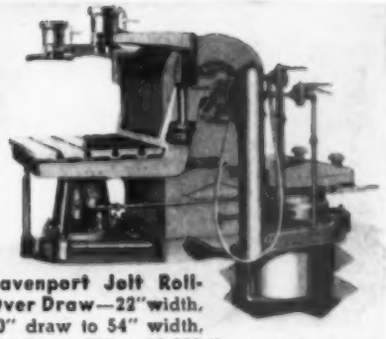

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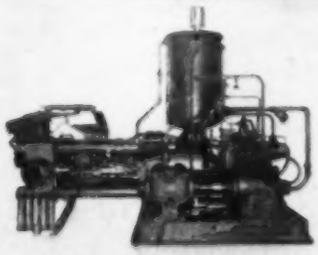

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(*Concluded from page* 78)
metal enter the same mold cavity, the film must be broken if they are to unite. They must unite if a perfect casting is to be produced. If they do not unite, a seam will be produced. The metal must be poured at a temperature to insure sufficient fluidity to enable these streams to unite without the formation of a seam. The gating must promote this uniting effect as quietly as possible and with an absolute minimum of agitation.

Risers are absolutely imperative on high shrinkage alloys. To have risers effective, the metal in them necessarily must be at a higher temperature than that of the metal they are to feed. Obviously the gate should lead hot metal into the risers and insure a temperature in excess of that of the casting. It is common practice to add superheated metal to the risers after the casting has been poured. Care is taken to pour the metal into the riser with as little agitation as possible.

Metal should enter the mold through gates provided for such entrance and not through gates leading to the risers. Metal entering from the risers falls into the mold and agitates or stirs the metal to forms slag spots. The gate connecting the riser with the casting should be of adequate size to avoid any chance freezing before feeding is completed. The junction of the gate with the casting and with the riser should be well filleted.

Sand should be rammed firmly around the gates but not hard enough to cause blowing. Venting should be of the very best so that air rushing through the mold upon the entrance of hot metal will not tear the surface.

Chills may be used on sections of castings located where feeding by a riser practically is impossible. Chills must be used sparingly. They should be constructed to cause a minimum amount of trouble from blowing. By passing enough metal over the chill to warm it, the tendency to blowing sometimes is reduced; but the tendency to wash the sand at the junction of chill and sand also is increased. Gating the castings so that the metal has to pass over such a junction for an extended period, is not good practice and may lead to difficulties.

Bureau of mines, department of the interior, Washington, has issued bulletin No. 403 which is entitled "Asbestos," by Oliver Bowles. The bulletin describes the different varieties, and gives their physical properties, describes its uses, and presents detailed information on production and consumption of domestic and foreign deposits. Copies of the bulletin may be obtained from the superintendent of documents, Washington, for 15 cents.

Consider Questions Of Management

(*Concluded from page* 36)
result that the purchasing power of wage rates at the present time is far above the purchasing power of the rates at earlier dates when the condition of labor was known to be rapidly improving in this country."

Citing the increase in wages through the various periods since 1933. Prof. Wolman said that throughout this period recovery in many industries has lagged with unemployment persisting in large volume, and observed: "Now with another turn in business and decline in employment, one may question the soundness of an economic policy which depends for its success on raising the price of labor and the general level of production costs."

Prevailing high wages are only in part due to improved business and the speaker declared much of what has happened since 1933 is due to governmental regulation of wages and the growth of organized labor. During the NRA in 1933 wages rose 30 per cent and more in some instances. During 1936-37 the level again went upward 15 per cent more, or when the organizing campaigns of the American Federation of Labor and the CIO were at their height, according to Prof. Wolman.

Responsible for Contracts

A strong plea of regulatory laws applying to labor unions was made by T. Y. Williams, League for Industrial Rights, who declared such laws are not only needed now, but always have been and always will be needed. Not because labor organizations are merely unions should they be held accountable legally for their acts and held responsible for contracts and the observance of general law, but because the unions are functional groups operating within the social and economic structure, Mr. Williams declared.

Other functional groups, including industry, are subject to regulation, and in other nations regardless of form of government the unions are subjected to regulatory laws, from the iron-fisted controls of Italy and Germany to the moderate and understanding control of England.

Practical and legal procedure in meeting complex issues confronting industry in the operation of the national labor relations act was outlined by Otto A. Jaburek, arising in employer-employe relations, gave informal suggestions as to legal paths follow in several specific controversies.

The following members were elected to the district committees: First district, A. B. Root Jr., Hunt-Spiller Mfg. Corp., Boston; H. S. Washburn, Plainville Casting Co., Plainville, Conn.; Ernest F. Stockwell, Barbour Stockwell Co., Cambridge, Mass.; G. R. Holmes, the McLagon Foundry Co., New Haven, Conn.; and H. B. Johnson Jr., General Fire Extinguisher Co., Providence, R. I.

Second district—W. W. Bates, Delaware & Hudson Railroad Corp., Albany, N. Y.; Noah F. Young, Lumen Bearing Co., Buffalo; R. H. Goodwillie, Otis Elevator Co., Yonkers, N. Y.; Irving L. Jones, International Heater Co., Utica, N. Y.; and P. R. Van Duyne, Meeker Foundry Co., Newark, N. J.

Third district—W. S. Shipley, York Ice Machinery Corp., York, Pa.; D. C. Bakewell, Blaw-Knox Co., Pittsburgh; C. H. Hoffstetter, Odin Stove Mfg. Co., Erie, Pa.; James H. Anderson, Cooper-Bessemer Corp., Grove City, Pa.; and G. L. Coppage, Pusey & Jones Corp., Wilmington, Del.

Represent South and West

Fourth district—George A. Seyler, the Lunkenheimer Co., Cincinnati; J. S. Tatman, Roots-Connersville Blower Corp., Connersville, Ind.; C. F. Seelbach, Forest City Foundries Co., Cleveland; George P. Waller, Wilson Foundry & Machine Co., Pontiac, Mich.; and Chester A. Peebles, Stedman's Foundry & Machine Works, Aurora, Ind.

Fifth district—H. G. Myers, Gardner-Denver Co., Quincy, Ill.; H. E. Muchnic, Locomotive Finished Material Co., Atchison, Kans.; J. C. Sanders, American Foundry & Mfg. Co., St. Louis; A. H. Head, John Deere Tractor Co., Waterloo, Iowa; and C. B. Magrath, Greenlee Foundry Co., Chicago.

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Seventh district—H. E. McWane, Lynchburg Foundry Co., Lynchburg, Va.; A. I. Brainard, Beaumont Iron Works Co., Beaumont, Tex.; Houston Dudley, Gray & Dudley Co., Nashville, Tenn.; G. E. Jones, United States Pipe & Foundry Co., Bessemer, Ala.; and H. C. Stockham, Stockham Pipe Fittings Co., Birmingham, Ala. This district covers the South and Southwest.

The following past presidents of the association were elected honorary members of the council: Thomas S. Hammond, Whiting Corp., Harvey, Ill.; S. Wells Utley, Detroit Steel Casting Co., Detroit; and Thomas W. Pangborn, Pangborn Corp., Hagerstown, Md.

Figure the Cost . . .

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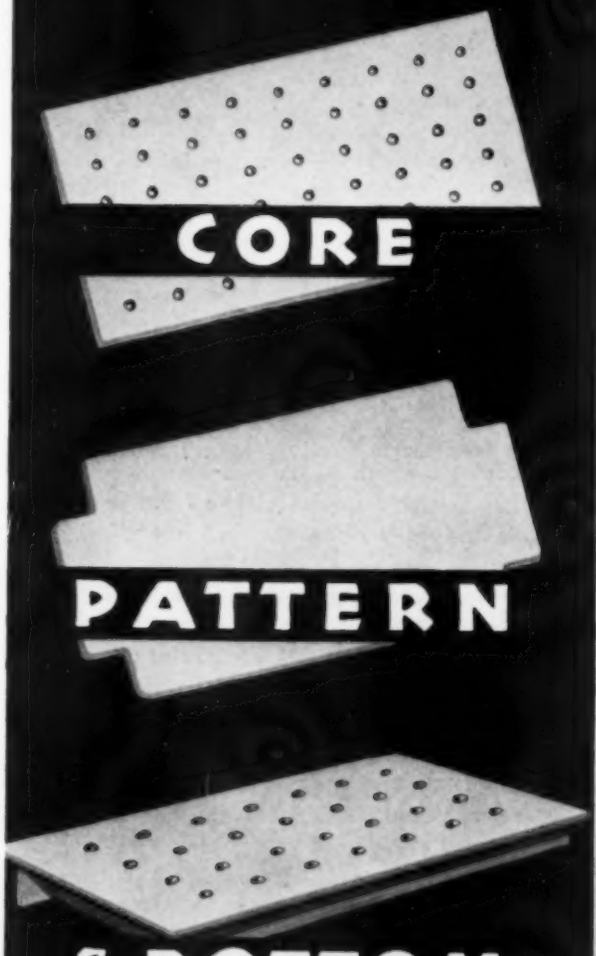

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Diesel Engine Castings

(*Concluded from page* 32)

core is rammed in half sections and pasted together. The jacket cores are rammed on dryers and fitted together during the coring-up operation. It is extremely important to use thin-stem chaplets to insure proper fusing and prevent subsequent leaks during the water pressure test.

The mold made from a two-part or split pattern, suitably mounted for machine production is rammed, finished, and cored in a horizontal position. After the cores are securely set, the mold is closed and stood on end for pouring. The sand and blacking are the same as on the head. The mold is dried at approximately 600 degrees Fahr.

Gating Is Important

Great precautions are taken to get clean hot iron into the casting. Inclusions of any kind in the thin sections would lead to scrap. The sprue and gates in this case are rammed at the same time as the mold. Gates consist of a series of inlets or branches that have their origin at the enlarged section of the down sprue as shown in Fig. 4 where *A* is the pouring basin, *B* is the sprue, *C* the enlarged section, *D* the inlet gates, *E* the casting. *F* is a vent pipe from the core. The enlarged section *C* cleans the metal to a certain extent. The metal is swirled, which tends to produce a vortex that will hold the slag and dirt. As the mold fills and the level of each inlet branch is reached, hot metal is introduced at the point where it is most needed. This helps materially in the thin sections for at no point is the metal forced to travel through thin sections for a long distance.

This gate permits a gentle impact of metal on the cores. The long drop of the metal is in the main sprue. No rush of metal hits the cores, thereby avoiding cutting in and subsequent disturbances. The metal entering from the bottom does not interfere with the gas accumulation as the main vent is off the top of the mold.

Gases should come off freely. A lack of proper venting will lead to blows, seams and cold shuts. It is extremely important that gases should come off freely from both the jacket and center cores.

It is necessary to pour the manifolds with hot iron to insure the thin sections running properly. Good castings have been obtained with metal as low as 2600 degrees Fahr. but 2650 degrees Fahr. was set up as a standard for the minimum pouring temperature and it is desired to have a temperature higher than that if possible. Metal at a temperature in excess of 2750 degrees Fahr. frequently burns in the cores. Above this temperature, metal penetration of the jacket cores is quite prevalent.

Due to the thin sections, it is necessary to use a highly graphitic iron to prevent any chilled areas. The iron mixture for these manifolds contains 50 per cent steel rails and the final analysis shows: Silicon, 2.35 to 2.50 per cent; carbon, 3.10 to 3.25 per cent; manganese, 0.80 to 1.00 per cent; sulphur less than 0.12 per cent; phosphorus less than 0.20 per cent; nickel, 0.50 per cent.

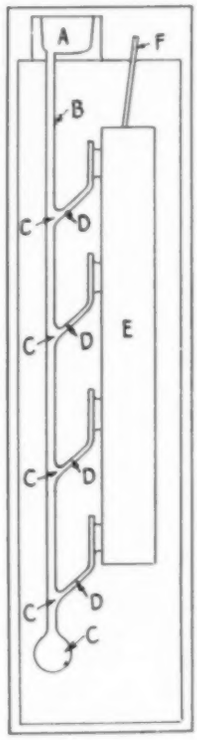

Fig. 4—Method of gating long and thin manifold castings

This metal shows a close, dense structure, free from porosity. No difficulty traceable to an iron fault is experienced at the water test. The machined sections are considerably thicker than the jacketed sections, which are wholly graphitic, so the castings are machined readily.

When pouring these castings a plug is inserted in the opening of the main sprue until the runner box is filled. This gives any dirt a chance to accumulate on the top of the pouring basin. Then the plug is removed and the runner box kept full during the entire pouring operation. The metal is poured rapidly and care is taken not to make the openings of the branch gates leading into the casting so small that the metal will enter the mold under too great a pressure. This might prove harmful to the cores, if the iron is permitted to strike them with too much force.

In the cleaning operation no difficulty is experienced with the exterior of the casting. The sand peels off readily and leaves a clean smooth surface. The only difficulty experienced in removing the cores is when the metal is poured too hot or proper care not taken in the preparation of the core.

The areas requiring machining are easily cut and are free from sand spots and other defects especially blowholes, when the venting has been adequate. When proper care is taken in the coring operation the manifolds are surprisingly true to dimensions and noticeably free from swells and similar imperfections.

WPA Uses Cast Pipe And Fittings

Cast iron pipe and fittings valued at $29,600,392 were among the nearly one-half billion dollars worth of materials, supplies and equipment bought for projects of the Works Progress Administration in its first 26 months of operation up to Sept. 1, 1937, according to records of the division of research, statistics and records of the WPA. Of the amount expended for pipe and fittings, $14,415,046 was in Federal funds from various emergency relief appropriations, while $15,185,346 was in funds of the project sponsors.

Construction and repair accounted for 80 per cent of the WPA activities, so that the liberal use of cast iron pipe and fittings is easily explained. In the construction of public buildings, of various conservation works, of sewer systems and other utilities, and in drainage jobs of divers character, the use of these materials was often specified.

There has been no general ruling from Washington headquarters as to the types of materials to be used for certain jobs. Discretion, within reasonable limits, is left with the engineers and architects actually in charge of the work and plans are only disapproved as to specifications for materials when they are obviously out of line as to costs or suitability. Plans containing unbalanced materials specifications seldom get as far as Washington, however, since they are checked in both district and state offices before being endorsed for final approval.

All purchases from Federal funds were made by the Procurement division of the United States treasury department after open competitive bidding. The bulk of the purchases was in comparatively small lots for individual projects.

Becomes Important Factor

(*Concluded from page* 33)

many dollars worth of chills, gaggers, pins and spills by removing them from the sand.

A jolter, sandslinger or other high speed molding unit is the heart of the foundry and it is there that the highest efficiency must be maintained. Spare parts, extra fittings, valves, bearings and even a spare unit must be on hand in case of a breakdown. Every minute the unit is down means a loss in the shop. Spare parts used must be replaced immediately so that they will be on hand. Parts which wear out quickly should be replaced if possible with more permanent pieces. The unit must function perfectly. Experienced trouble shooters should make frequent inspections to detect any wear which may give trouble later. Catch a breakdown before it comes and you will be money ahead.

Accessory Equipment Essential

High speed molding machines must be served properly to make them pay for their installation. Do not install high speed units without making provisions to supply the required amount of sand and also a shakeout to take care of the flasks and return them in time to the molding machines.

The question frequently arises whether to install one sand system for all units, one for each unit or one for each pair of units. Each system has advantages and disadvantages. With one system a major breakdown stops production, while with several units, production may continue at a reduced rate, until the necessary repairs are made. During slack times one of the multiple units may be closed down with the resulting saving in power and wear and tear on the unit. One system must be run whether one molding machine is operating or all are operating. Layout of the shop and the class of work handled also will determine the number of sand systems and units to use.

The following details illustrate some difficulties we have had with a sand system and what we did to overcome them. Sand must be elevated to supply a molding machine. Two methods are in general use, an elevator or an inclined belt. We have both. For an elevator the best quality belt will pay in the long run. The belt has a heavy load to carry and may be subjected to several strains. A broken belt means a costly delay, hours of hard work digging out the sand and restoring tne belt to working order. Do not try to economize on belts. For an inclined belt, side aprons were supplied. Troughing rolls are more desirable. The side aprons rub the belt to prevent the loss of sand and the belt wears at the point of contact. Troughing rolls give the same results without wearing the belt.

Sand mills are a necessary part of the sand system and present an acute problem in maintenance. The moving parts are constantly in contact with the sand and proper lubrication is a problem. For a stationary pan and revolving mullers, a rugged and dependable center bearing is desirable.

Flask shakeouts are necessary for high speed units. The flasks must be shaken out after the castings have been removed to keep the molding machine gang going. Air or mechanical shakeouts may be used.

Apron Type Conveyor Preferred

Sand from the shakeout is warm and cannot be handled by a rubber belt. We prefer a slow moving sprocket drive apron conveyor consisting of pans connected by links. Shear pins must be provided to prevent excessive strains on the conveyor. The conveyor is difficult to lubricate properly. Case hardened links have been tried to reduce the cost of maintenance.

An air driven hammer seems to be desirable for a casting shakeout. Castings are suspended in front of the hammer and the castings are picked up and laid down by some form of movable hoist. The sand knocked out of the casting is removed by a belt which passes over a magnetic pulley. The sand may be reconditioned with the help of a vibrating screen and used over again. The hammer and hoist are not costly to maintain and if proper care is taken the belt and magnetic pulley will give many months of service.

The core room may be as mechanical as you care to make it. A sand mill is necessary with perhaps a skip hoist and a car for distributing the sand to the bins. Core racks and core trucks or a crane may be employed to handle racks to and from the ovens.

The cleaning room contains equipment for annealing, sandblasting and chipping. An efficient tool room where the chipping hammers are kept in first-class operating order is indispensable. The men will do better work, cut more pieces and be better satisfied with good hammers.

Insulation on the annealing furnace will show a material saving. I recently heard the dean of open hearth men say "The time is coming when we must insulate to stay in business." His remark also applies to annealing furnaces, core ovens and dry sand ovens. We have not taken the matter of insulation seriously enough.

About a year ago we installed a sandblast unit which we believe is new in this district. The blast chamber is a long steel lined room open at both ends. Castings to be cleaned are suspended from a continuous chain and move past the operators, who are on the outside of the room. Four stations, two on each side, are staggered and each operator looks through a window. The blast nozzle is at the end of a pipe about 4 feet long which the operator controls with a hand wheel. Dust collectors are provided for visibility only. The operator works without respirator, goggles or any other protective device. We have cleaned side frames, bolsters and yokes. With the proper rigging miscellaneous castings also may be handled. The installation is a decided step toward better working conditions for the sandblast operator.

Installs Improved Type Lights

Proper illumination of a cleaning chamber is important. Lights must be placed to the best advantage and still be in position to resist the abrasive action of the shot. Original protective globes lasted about a week. Final solution was a steel box with a heavy glass inserted in the wall of the chamber to the right and left of each operator. Light from the box is supplied by a globe and reflector which can be changed in a few minutes.

Inside lining of the chamber will wear out and its protection is a problem which up to the present has not been solved satisfactorily. Old pieces of belting, loose chain and even steel plates which can be replaced, will cut down the repair bill.

On a new installation of any kind provisions should be made for repair or replacement which is bound to come. Place an I-beam over a motor to be used when the armature is changed. Do not put in a concrete wall which has to be chipped out before a part can be removed. A little thought before hand will save hours of costly delay and keep production up to standard.

Safety of employes should be kept in mind when making a layout. Make provisions for the trouble shooter to work and work safely. A costly accident has to be paid for by the employer and means to the employe many hours of suffering that might have been avoided.

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Increases temperature of riser metal.
Holds it liquid three times the normal setting time . . . Permits feeding of castings.
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"SPEEDY" MOISTURE TESTER:

Is the only instrument which permits control of moisture in both molding and core sands by the average foundry laborer.

Enables you to ascertain moisture content of sand in a few moments. If the moisture content of your sand is required, you cannot do without this simple instrument to ascertain moisture at the sand pile. Ask for further particulars.

References from constant users of all our products gladly submitted. Write for literature.

THE ALPHA-LUX COMPANY, INC.

192 Front St., New York City
PLANTS: Philadelphia, Pa.—Cicero, Ill.

Operating A Cupola

(*Concluded from page* 37)

the cupola as efficiently as possible iron must be melted in the presence of carbon dioxide. Experience has shown that this point is about 18 inches above the tuyeres.

The blower must be of sufficient capacity to force air to the center of the cupola in proper volume to

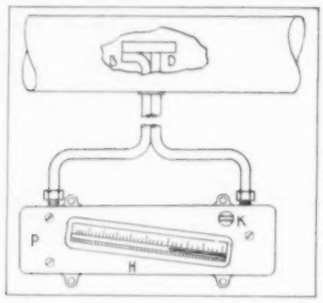


Fig. 2—Instrument for indicating the volume of air introduced into the cupola

unite with the carbon. Pressure varies from 8 to 16 ounces depending on the condition of the charges, their size and density. At the beginning of the heat the charges are fairly open and the air passes through freely. Later, the tuyeres become partly closed with slag. Density of the charges becomes greater and a lower blast pressure is recorded at the beginning of the heat than that shown as the heat progresses. Volume of air required for various diameter cupolas, compiled by cupola builders and engineers, is shown in the accompanying table. Thus for an 84-inch diameter cupola a blower will be required to supply from 900,000 to 1,000,000 cubic feet of air to melt 44 tons of iron in approximately 1½ hours.

Blowers usually are rated by the manufacturer and marked for cubic feet of air displacement per revolution. With this information the foundryman can decide on the speed at which it is to be driven for required volume. An instrument for recording the volume of air entering the cupola is shown in Fig. 2. It is made up of two parts, the pressure tubes at each side and the pressure gage. The pressure tubes are fastened together and placed in the blast pipe as shown so that the blast passes through the tubes on its way to the cupola. Velocity of the air passing through the tube *D* has no effect on the pressure in that tube, but the blast blowing directly into the end of the bent tube *B* does affect the pressure in that tube. The two tubes are connected to a gage *P* at each end and the gage is leveled by the spirit level *K*. When no air is flowing through the blast pipe the liquid in the tube rests quietly. When air is flowing through the blast pipe, pressure at the left is greater than at the right and the liquid is forced down in the tube *H*. The distance the liquid is forced down indicates the number of cubic feet of air flowing through the blast pipe and may be read from the graduated scale.

In lining a cupola, particular stress must be laid on the manner of laying the brick so that all joints will be as tight as possible. The closer the joints in the brick, the longer the life of the lining. Disintegration begins at the joints. Flame and hot gases under pressure enter the open joints between the bricks and rapidly destroy them. The highest grade fire clay should be used as a binder. Several alternative types of lining as described and illustrated in Moldenke's *Principles of Iron Founding* are shown in Fig. 3.

The single lining at *A* is used for small diameter cupolas and may be either the special cupola block at the left, or standard arch firebrick shown at the right. The double lining shown at *B* is a better and more lasting type. A course of split brick is laid next to the shell while the next layer is either the blocks at the left or the bricks at the right. Other variations of double lining are shown at *C* and *D* and are designed for use in large cupolas running long heats.

A space from ¾ to 1-inch and filled with sand is left between the shell and the brick work to take care of expansion and contraction. The brick or cupola block are laid as close as possible, merely dipped in a thin grout, to prevent the entrance of slag or metal. All openings between the bricks are filled with clay slurry as the lining is built upward. The bottom ring of the cupola supports the lining, but additional supports, angle iron rings are attached to the shell at several points. The number of these rings and the distance apart depend on the height and diameter of the

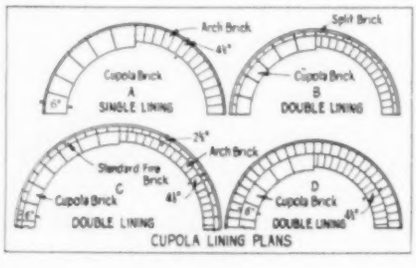


Fig. 3—Alternative methods of lining the cupola

cupola. One of the advantages of these rings is that an entire section of the lining if necessary may be removed at any time and replaced without disturbing the remainder of the lining. On account of the difference in temperature, a single lining is sufficient from the charging door upward. In many instances iron blocks are substituted for fire clay bricks for a distance of several feet below the charging door where abrasion from the falling charges is greatest.

After the stack has been bricklined to the top, a fire is built in the bottom to evaporate all the moisture. The bottom doors are put up and a sand bottom built in the usual manner. This precaution sometimes is omitted and the fire is built on the bare doors. The fire if prolonged to any extent may cause the doors to crack or warp. With a proper bottom a coke fire may be built in the cupola and kept going until the lining is thoroughly dried. The bottom then is dropped and the lining is inspected and if necessary any minor repairs are effected before the bottom doors are put up and the regular sand bottom put in preparatory to taking off a heat.

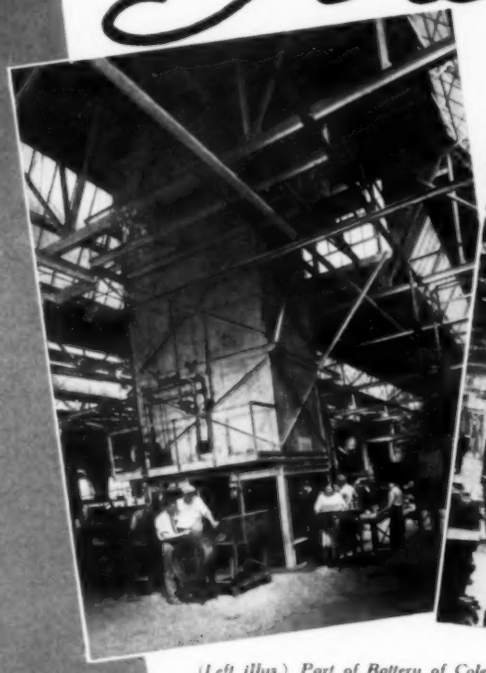
Pattern Standards

American Foundrymen's association recently has prepared a new supply of the poster on "Standard Pattern Colors." This poster, in color, is suitable for display on bulletin boards, and is similar to that presented in *Foundrymen's Handbook* and *Cast Metals Handbook*. The poster may be obtained from the American Foundrymen's association, 222 West Adams Street, Chicago, at a price of 10 cents for a single copy, 5 cents each in lots of five to 50, and $4.00 a hundred in larger lots.

Symposium on Wear

American Society for Testing Materials, Philadelphia, recently has published in pamphlet form, six papers and discussions on the wear of metals. The papers formed a symposium on that subject which was held at a meeting sponsored by the Philadelphia district committee of the A.S.T.M. in Philadelphia. Phases covered by the papers include considerations involved in wear testing of metals, wear testing of cast iron, wear of metals from the automotive viewpoint, wear of power equipment, wear of textile equipment, and wear of railroad equipment. Copies of the pamphlet may be obtained from the society, 260 South Broad street, Philadelphia, for $1.25 each.

Streamlined CORE BAKING



(Left illus.) Part of Battery of Coleman Vertical Core Ovens in leading specialty foundry.
(Right illus.) Typical Coleman Horizontal Conveyor Core Oven in large automatic foundry.

WHEN your core-making requirements get beyond the capacity of ordinary handling methods, it will pay you to investigate the possibility of low-cost, straight-line production with a **Coleman Conveyor-Type Oven.**

The planning of a continuous oven layout is a highly specialized job. It requires the utmost in knowledge, skill and experience, if the most effective coordination of operations and the greatest reduction in costs are to be obtained with a reasonable investment.

Coleman Oven engineers have a background of nearly 35 years experience in core-baking equipment, including all types of ovens and the use of all kinds of fuels. They will gladly cooperate with you in the solution of your core-making problems.

COLEMAN OVENS
are also built in other types such as:

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Use whatever fuel is most economical in your vicinity—coke, coal, gas, oil, etc. Write for catalog and bulletins.

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FOUNDRY EQUIPMENT CO.
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CORE *and* MOLD OVENS

Sand Handling and Mould Conveying System by Eastern Corp. in the Newbury Mfg. Co. Foundry at Talladega, Ala.

MODERN FOUNDRY EQUIPMENT . .

. . by Eastern Corporation frequently pays for itself within two years (sometimes in less) and keeps right on earning big returns on the investment in reduced cost per pound of castings—besides increasing foundry capacity. The only thing a foundry *cannot* afford these days is antiquated equipment and methods.

Eastern Corporation's foundry engineers can do much more for you than to supply modern equipment. They are ready to design, for your particular foundry, a complete production system—including sand conditioning, storage and handling, pouring, mould conveying, shakeouts—everything needed, properly coordinated for the most economical production of castings. They are ready to plan for you all or any part of this—and to supply all necessary modern equipment.

Eastern Corporation engineers know the foundry business from the ground up. They are foundrymen. Eastern equipment is fully abreast of the latest thoughts and offers many features not otherwise obtainable.

Why not get a report on what could be done by you? That much costs you nothing, commits you to nothing, should indicate how you can realize big profits through savings. Just say you're willing to be shown.

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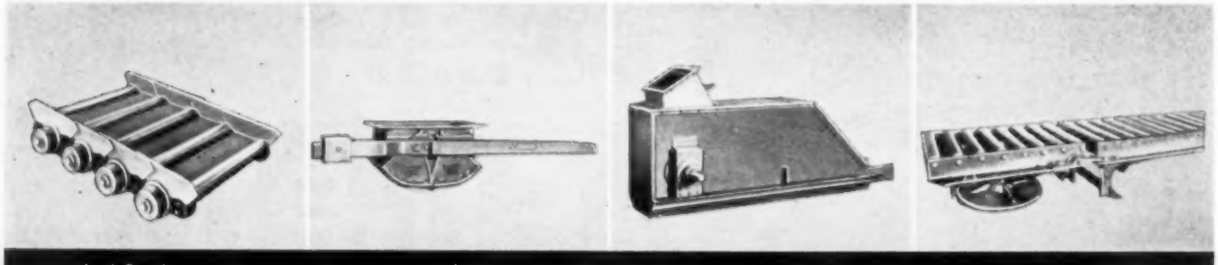
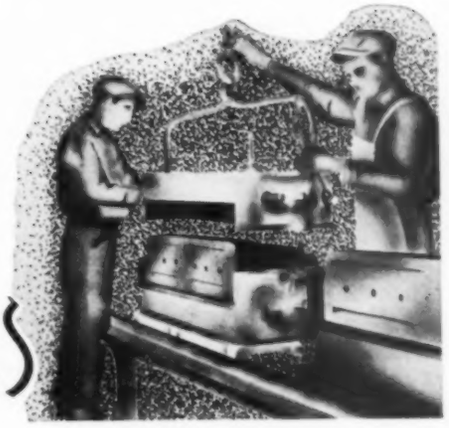


Leak-Proof Apron Conveyor | Duplex Bin Gate | Sand Aerator | Turntable with Precision Roller Conveyor Top

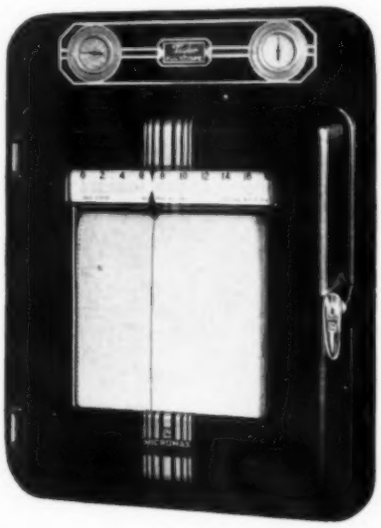
NEW EQUIPMENT for FOUNDRIES



Furnace Control

Taylor Instrument Companies, Rochester, N. Y., recently has placed on the market a new air-operated potentiometer controller to provide smooth, proportional valve action, and the potentiometer principle of temperature measurement. The controller, which is shown in the accompanying illustration, utilizes an adjustable, air-operated control mechanism which is employed in other instruments made by that firm. The temperature measuring system includes a recording and indicating potentiometer in which it is claimed that all functions affecting accuracy of temperature measurement are fully automatic, such as automatic reference—junction compensation; automatic, positive balancing of the potentiometer circuit; and automatic current standardization.

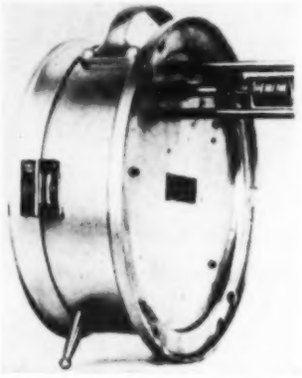
Principal parts of both mechanisms are interchangeable with many instruments now in service which are made by the firm. The control unit operates in conjunction with a diaphragm valve also made by the Taylor Instrument Companies. In addition, other devices are available for precision valve action or precision valve and compensation for charges in load.



Air-operated controller provides smooth valve action, and temperature measurement

Traveling Recorder

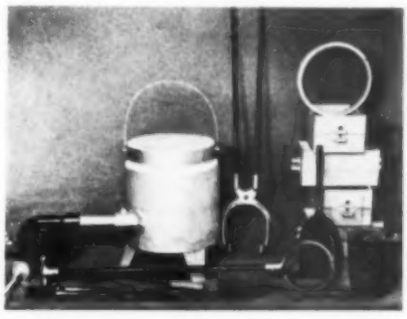
The Bristol Co., Waterbury, Conn., recently has placed on the market a new portable recording thermometer for use in conveyor type baking ovens, finishing ovens, enameling ovens, etc. The instrument shown in the accompanying illustration passes through the oven on the conveyor and gives a continuous record of the temperatures to which the heated product is subjected. These thermometers, it is claimed, find particular application in plants where electric and gas heaters, and ice refrigerators are manufactured. They are used extensively in ovens for treating the finish on automobile bodies where proper temperature is desired for the finished color. The instrument is compact, self contained and light in weight. The record appears on an 8-inch diameter chart for 24-hour or 7-day clock rotation.



The thermometer travels with the load through the oven and records the temperature

Gas Furnace

Waldemar F. Andersen, Alameda, Calif., has designed a small gas-fired furnace for melting nonferrous metals, and additional equipment is supplied to enable the purchaser to establish a small foundry. The furnace and other equipment are shown in the accompanying illustration and were developed particularly for amateur mechanics and model makers. The furnace will take a No. 5 graphite crucible which will hold about 15 pounds of brass or bronze, or 5 pounds of aluminum.

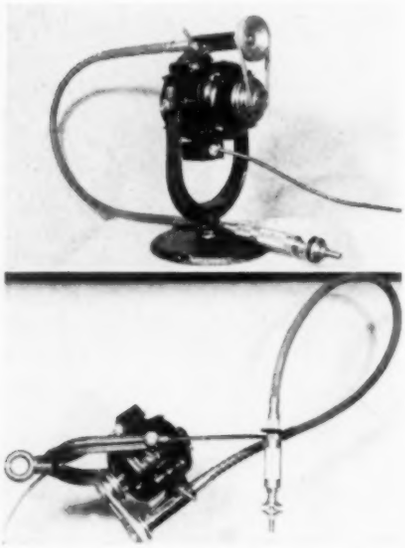


Small furnace will melt 15 pounds of brass, and with equipment shown can be used by amateur mechanics and modelmakers for producing small brass and aluminum castings

The complete set includes the furnace; 4 metal flasks, 5 x 8 inches inside dimension; 100 pounds of molding sand; rammer; crucible, crucible tongs and crucible shank; pickup tongs; riddle; shovel; ingot mold; rapping tool; draw spike; bottom boards; follow up board; sprue cutter; gate cutter; swab brush; brass flux, and instructions for operating the set including directions on simple molding procedure and coremaking. The furnace shell is made of gray cast iron with three legs molded to the bottom, and the blower is attached to the furnace with a saddle mounting. The furnace blower is driven by a universal 110 volt motor.

Flexible Shafting

The accompanying illustration shows two recent developments in flexible shaft equipment designed by the Stow Mfg. Co. Inc., Binghamton, N. Y. One of the machines is designed for mounting on the bench or on the wall while the other is arranged for mounting on a trolley or for suspension from a hook. Both units are the three-speed types, and are equipped with ball bearing countershafts. Countershafts are hinged and provided with screws for belt adjustment. The units are swiveled in both horizontal and vertical plane to provide use of the shaft in any position. Standard equipment includes switch, cord, plug and ball bearing hand piece with clamp spindle for grinding wheels, buffs, scratch brushes, etc. Angle heads and special hand pieces interchangeable with the standard hand piece can be supplied. Sizes of motors range from ⅛ to 1 horsepower.

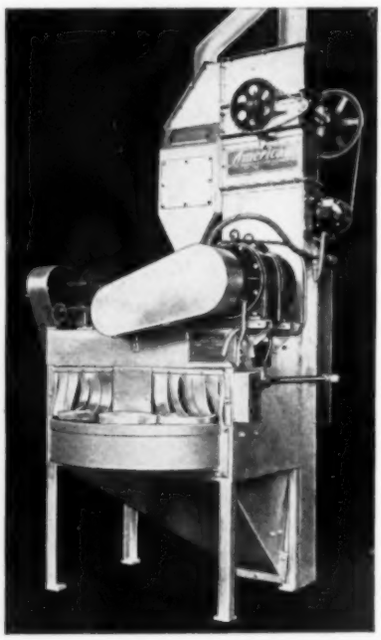


Flexible shaft machines for grinding, buffing, scratch brushing, etc., are designed for bench mounting or for suspension

Abrasive Blasting

American Foundry Equipment Co., Mishawaka, Ind., recently has designed a new table type blasting machine for cleaning small parts. The unit consists of a number of independent tables mounted on a spider which carries them directly under the blast zone. A motor-driven steel disk makes a contact with the tables, and rotates them eight times during each foot of travel. All work being cleaned is exposed to the blast, as the tables carrying the work turn constantly while in the blasting zone.

Abrasive used for cleaning is thrown against the work by centrifugal force. The cycle is claimed to be fully automatic. After the abrasive is thrown from the wheel it drops into a tapered hopper which feeds into the boot sections of an elevator. Elevator boots discharge by gravity into a rotary screen, where fines are removed, and the clean abrasive then falls into a storage hopper. A speed reducer on the table drive permits varying the speed of work through the blasting area. The cabinet is heavy steel plate, amply reinforced. The front half of the cabinet is cut away so that the operator can load and unload outside of the blast area. Opening across the front of the cabinet is baffled heavily with rubber curtains to prevent loss of flying abrasive. Dust seals are provided throughout the machine.



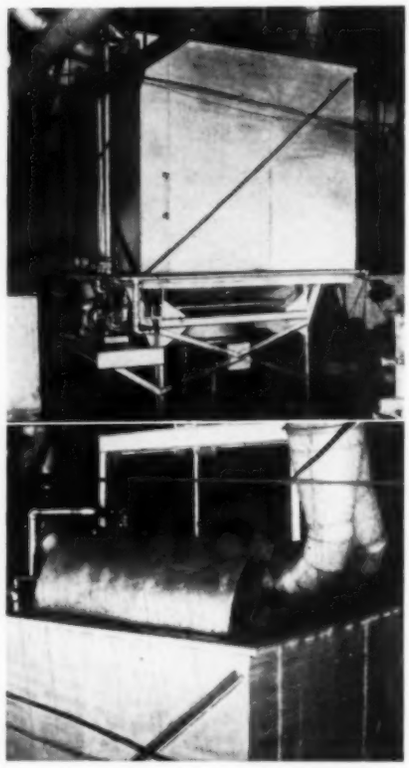
Independent tables are carried under the blast zone

Dust Collector

Stevenson & Smith Co., Detroit, has designed a wet type dust collector which is shown partially in the accompanying illustrations. The main body of the unit consists of two steel tanks; an outside one built around an inner tank, and a semicircular steel hood bolted to the top of the inner tank. The inner tank is lined with a system of steel drain shelves or louvers, and has a hopper at the bottom with a hand-operated bell gate for dumping sludge after draining. A series of circular screens mounted on a driven shaft rotate inside the hood, and those with a spray system constitute the collecting arrangement.

In operation the dust laden air enters the hood and passes through two water sprays located directly in front of the air inlet opening. The washed air then passes through the revolving circular screens which are mounted perpendicular to the air stream. Water level in the inside tank is maintained at the same level as the revolving screen shaft so that the screens rotate one-half in water. The wet screens are said to collect any dust which might pass the sprays at the inlet, and also serve to prevent flying water from the sprays entering the outlet air line.

Collected dust sinks into the water in the inner tank, and displaces the water which overflows into the outer tank. When the inner tank is full enough to dump, that fact is indicated by the water level in a gage glass on the outside tank. Solution of water and dust in the inside tank is allowed to stand for various periods depending upon the nature of the dust; longer periods being required for fine dust. After settling, the water in the inner tank is pumped into the outside tank by a centrifugal pump. Then the sludge is allowed to drain for a short period and dumped through the bell gate. After dumping the water is pumped from the outer tank to the inner tank, and sufficient new water added to bring the water level up to the overflow.



(Above)—Dust collecting unit has outer tank built around inner one. (Below)—Circular screens rotate inside semicircular hood mounted on inner tank

WITH no thought to steel or any product competitive with gray iron castings, Woodward Iron Company for more than 50 years has concentrated its facilities exclusively on the production of good pig iron. Pig iron buyers recognize that it is therefore to the interest of the Woodward Company to foster and promote in every way possible the growth of foundries using gray iron castings. Which is one reason why so many foundries say: "We prefer to buy from Woodward."

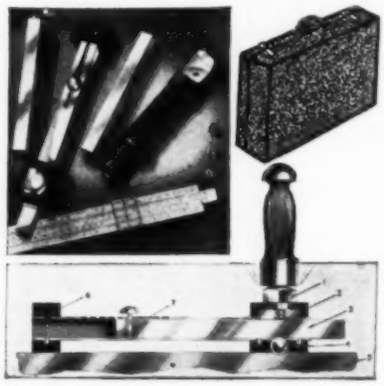
WOODWARD IRON COMPANY
WOODWARD, ALABAMA

America's Largest Completely Integrated and Entirely Independent Merchant Iron Producer

Brinell Testing

While designed primarily for testing the hardness of rebuilt, and heat treated rail ends, the device shown in the accompanying illustration can be employed for hardness determinations on large parts and equipment whose size ordinarily militates against use of instruments usually employed. The device is portable, and with the carrying case only weighs 6¼ pounds. The complete outfit is composed of the instrument proper, a bar of known hardness, a microscope with a scale etched in its focal plane, and a slide rule. The entire outfit is packed with extra bars and impression balls in a small case.

The instrument, manufactured by Teleweld Inc., Chicago, consists of a metal tube supported in a soft rubber head (2) and a rubber spacing block (6). The tube holds the bar of known hardness (3). The anvil (1) in the top of the rubber head rests directly on the bar. Below the bar an impression ball (4), secured in a narrow aperture in the base of the head comes in direct contact with the metal to be tested. The spacing bar (7) holds the bar in a clear area for each test. To make a test the instrument is held against the specimen and the anvil is struck a sharp blow with a 3 to 5-pound hammer. Impact is transmitted through the anvil to the bar, then to the ball and on to the specimen.



Light weight, portable instrument for determination of brinell hardness is simple to operate

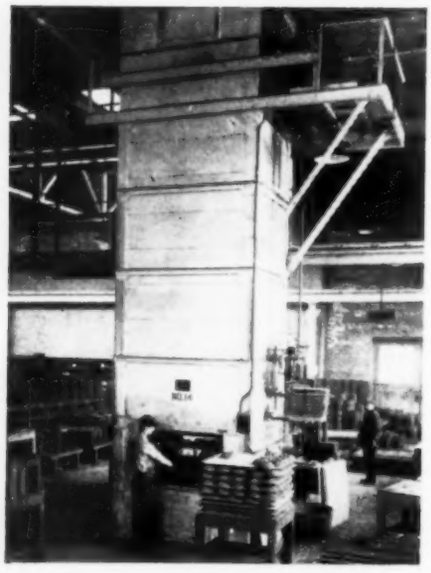
Rubber Handle

Federal Foundry Supply Co., 4600 East Seventy-first street, Cleveland, recently has placed on the market a molder's shovel equipped with a rubber protected malleable iron handle, shown in the accompanying illustration. For ordinary use it is claimed that the new handle is easier on the hands of the operator. When the handle is used as a pein rammer the rubber covering is an insurance that the pattern will not be damaged if and when the handle happens to come into contact with it. Scientifically designed taper of the handle prevents the sand from sticking.

The rubber covering prevents damage to the pattern

The handle forms an integral part of the shovel supplied by the company, or may be purchased separately for attachment to other types.

★ ★ DSM ★ ★



Small
Vertical Ovens
for core paste
or black wash
drying.

•

Oil
or Gas Fuel

Compact

•

Low Fuel Cost

•

Easily Installed

•

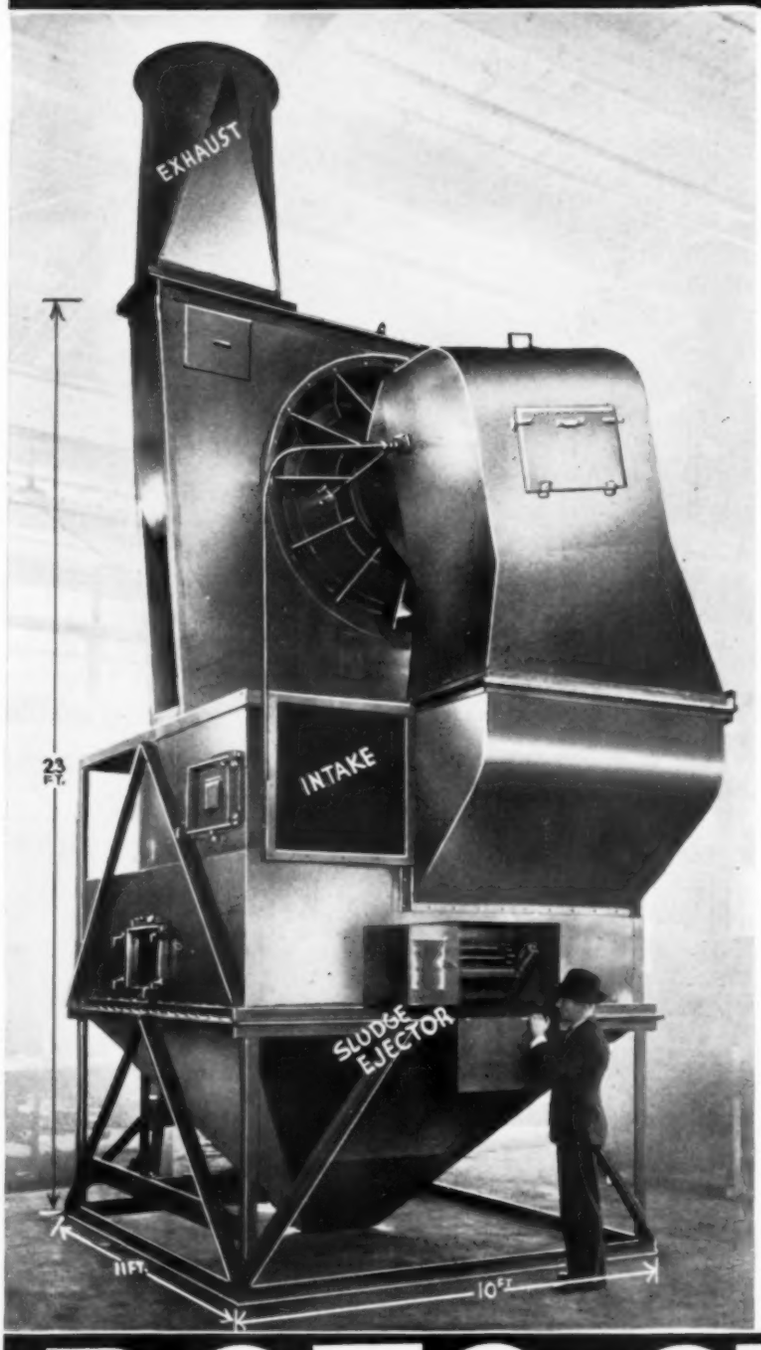
Speedier
Production

DETROIT SHEET METAL WORKS

DETROIT - - MICHIGAN

1270 Oakman Boulevard

THIS NO. 36 *Type W* ROTO-CLONE EXHAUSTS AND CLEANS 35,000 CUBIC FEET OF DUST LADEN AIR PER MINUTE !



The Type W Roto-Clone is a single compact self-contained unit, including pre-cleaner, hopper and sludge ejector, which may be located inside the foundry building at or near the source of the dust. Its design requires minimum floor space and does away with the necessity for fans, pumps, tanks or other auxiliary equipment to require attention and take up additional space. Made in a wide range of capacities to meet every foundry exhaust requirement including shake-outs, sand handling, conditioning screens, mullers, tumbling mills, sand blast, grinders, etc. Engineering data and literature will be sent on request.

AMERICAN AIR FILTER CO., Inc.
Incorporated
70 Central Ave., Louisville, Kentucky

In Canada:
Darling Bros., Ltd.,
Montreal, P. Q.

TYPE W

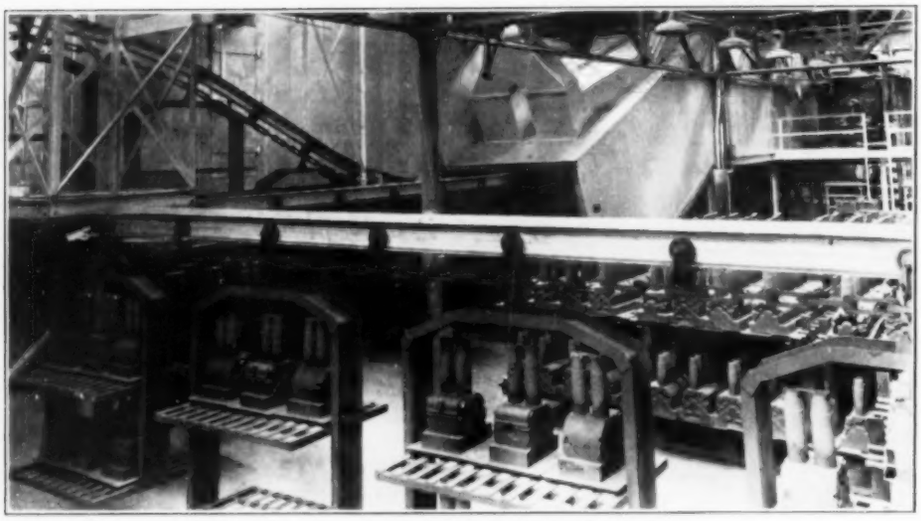
ROTO-CLONE
WATER SPRAY DYNAMIC PRECIPITATOR

STRAIGHT THINKING FOR 1938

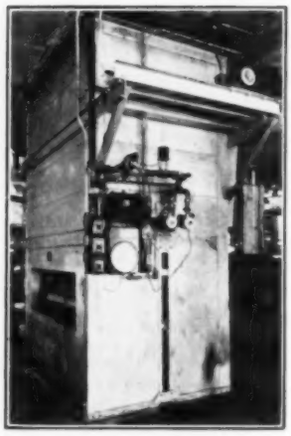
HIGHER EFFICIENCY—LOWER PRODUCTION COSTS

Buy Modern Metal Insulated Core & Mold Ovens

from Carl-Mayer



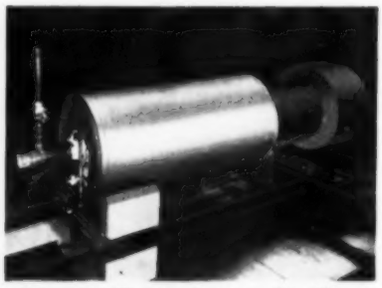
Continuous Monorail Core Oven (Packard)



Vertical Core Oven, An Efficient, Space Saving Unit (Packard)

• OVENS •

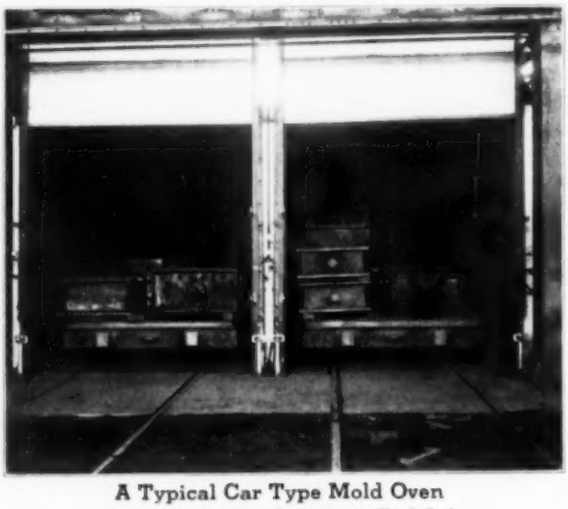
CORE & MOLD OVENS
PASTE DRYING—BLACKING
SHELF — RACK — CAR
AND ALL CONVEYOR
TYPES



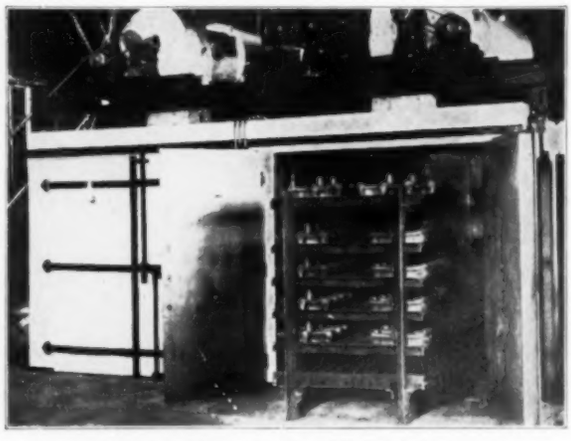
"Mayer" Recirculating Air Heater

• HEATED WITH •

GAS—BUTANE—PROPANE
OIL — COKE — COAL
ELECTRIC HEAT — STEAM
AIR HEATERS &
CONVENTIONAL METHODS



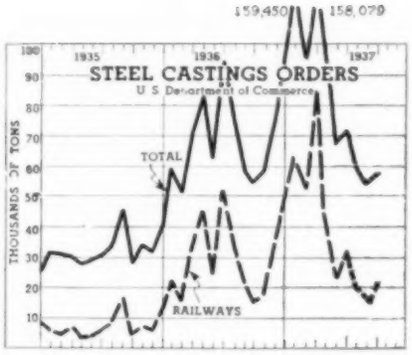
A Typical Car Type Mold Oven
(Courtesy Chicago Pneumatic Tool Co.)

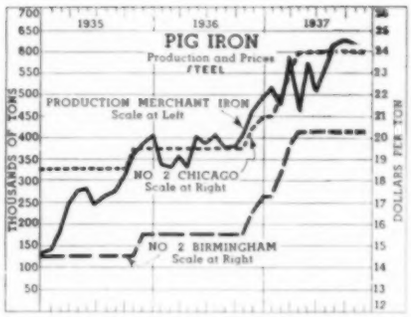


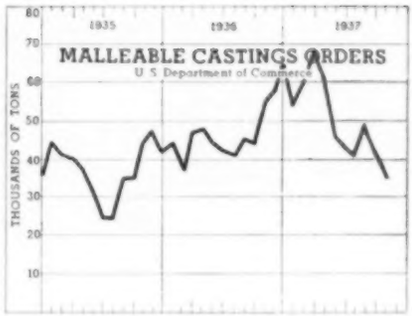
Rack Type Core Ovens With Air Heaters
(Electric Autolite Co.)

Write for new literature to:

3031 EUCLID AVENUE **THE CARL-MAYER CORP.** **CLEVELAND, OHIO**







FOUNDRY ACTIVITIES

ECORSE FOUNDRY CO., Ecorse, Mich., reports a steady increase of business since completion of its modernization program, according to Arthur S. Anderson, vice president and general manager. The program included rebuilding and expansion work and the installation of modern equipment. The main foundry building covers approximately 80,000 square feet and in addition a pattern shop, a pattern storage building, and new office building, are included. L. A. Young is chairman of the board, and John N. Crinnion is president.

* * *

Twin City Foundry Co. has been moved from Aberdeen, Wash., to Route 2, Hoquiam, Wash.

* * *

Walter Roloff has been appointed receiver of the Moloch Foundry & Machine Co., Kaukauna, Wis.

* * *

Extension to the foundry building of the Texas Steel Co., Fort Worth, Texas, will be completed early in 1938.

* * *

Oriskany Malleable Iron Co., Oriskany, N. Y., recently elected the following officers: President, Harrison S. Sweet; vice presidents, Annis Graham Borough and Edward G. Locke; secretary-treasurer, Leo J. Oster; and assistant secretary, James E. Corbitt.

RAW MATERIAL PRICES
Dec. 2, 1937

Iron	
No. 2 foundry, Valley	$24.00
No. 2 Southern Birmingham	20.00
No. 2 foundry, Chicago	24.00
No. 2 foundry, Buffalo	24.00
Basic, Buffalo	23.00
Basic, Valley	23.50
Malleable, Chicago	24.00
Malleable, Buffalo	24.50
Charcoal iron, furnace	27.00
Coke	
Connellsville beehive premium	$ 5.75 to $ 6.25
Wise county beehive coke	5.50 to 6.50
Detroit by-product delivered	11.10
Scrap	
Heavy melting steel, Valley	$13.50 to $14.50
Heavy melting steel, Pitts. (div.)	13.00 to 13.50
Heavy melting steel, Chicago	11.50 to 12.00
Stove plate, Buffalo	11.50 to 12.00
Stove plate, Chicago	8.50 to 9.00
No. 1 cast, New York	12.00 to 12.50
No. 1 cast, mchy., Chicago	11.50 to 12.00
No. 1 cast, Pittsburgh	16.50 to 17.00
No. 1 cast, Philadelphia	16.00 to 16.50
No. 1 cast, Birmingham	15.50 to 16.00
Car wheels, iron, Pittsburgh	15.00 to 15.50
Car wheels, iron, Chicago	14.50 to 15.00
Railroad malleable, Chicago	14.00 to 14.50
Malleable, Buffalo	14.00 to 14.50
Nonferrous Metals	**Cents per pound**
Castings copper, refinery	10.27½
Straights tin	43.25
Aluminum, 99 per cent	20.00
Aluminum, No. 12 (Secondary, standard)	17.50 to 18.00
Lead, New York	5.00
Antimony, New York	14.75
Nickel, electro	35.00
Zinc, East St. Louis, Ill.	5.25

J. I. Case Co., Racine, Wis., makers of tractors, farm implements, etc., plans construction of a heat treating shop, 130 x 500 feet.

* * *

Schramm, Inc., West Chester, Pa., manufacturers of air compressors, recently completed a 25,000 square foot factory addition.

* * *

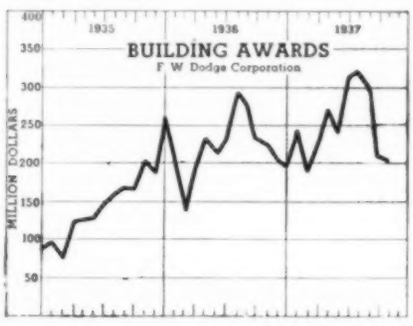
Garden City Fan & Ventilator Co., Niles, Mich., is having plans prepared for rebuilding its factory and office building at an estimated cost of $60,000 including equipment.

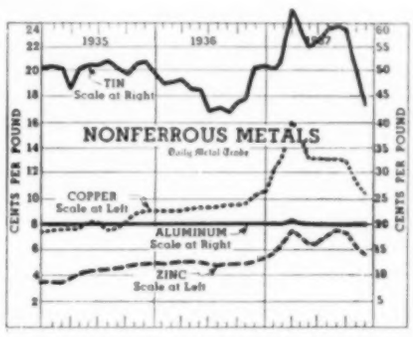
* * *

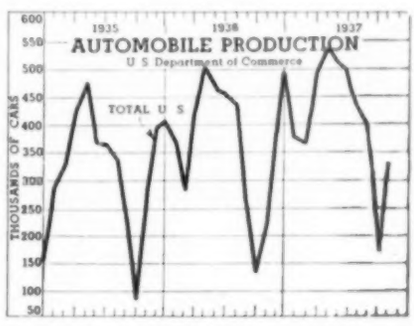
Plant of the Conemaugh Iron Works, Blairsville, Pa., which has been closed for some time, has been reopened by the Conemaugh Sanitary Manufacturing Co. to produce cast iron enamel ware.

* * *

Production of iron and steel castings in the Philadelphia Federal Reserve district declined in October, according to reports of the Industrial Research Department, University of Pennsylvania. Output of







jobbing work in gray iron foundries decreased 13.2%. Declines in production of shipments from September to October were not offset by increased unfilled orders.

* * *

Pacific Cast Iron Fitting Co., 9400 Rayo avenue, Los Angeles, has secured a permit for the construction of an addition to its foundry in the South Gate industrial district between Los Angeles and the harbor.

* * *

Electro Alloys Inc., 1026 King street, South Bend, Ind., recently has been organized to produce abrasive resistant castings. Officers of the company include William Shaw, president, Mrs. D. H. Bennett, vice president, D. H. Bennett, secretary-treasurer. Mr. Shaw was connected with the American Foundry Equipment Co., Mishawaka, Ind., several years.

* * *

Hafemeister Machine Co., Menasha, Wis., has been incorporated to conduct a general foundry and machine shop business, by Edgar E. Becker, Walter F. Casperson and Louis H. Hafemeister.

* * *

Menasco Mfg. Co., 6815 McKinley avenue, Los Angeles, manufacturer of aircraft engines, has secured a permit for the construction of a new foundry building, 50 x 100 feet.

* * *

Metalloy Products Co., 140 West Atwater street, Detroit, recently has been formed by Witold Watha Kosicki. The firm operates a foundry producing various nonferrous alloys such as white metal bearings, solder, aluminum, cast brass and bronze.

* * *

Index of foundry equipment orders for October was 185.2 as compared with 231.8 September and 173.8 in October 1936. Index of shipments was 232.3 in October as compared with 235.4 the previous month. Index of unfilled orders dropped from 347.5 in September to 309.3 in October.

* * *

Gallipolis Stove & Foundry Co., Gallipolis, O., recently has been formed as a consolidation of the Thompson Francis Stove Co., Gallipolis; Treasure Stove Co., Gallipolis; Artcraft Stove Co., Columbus, O. and Ohio State Stove & Mfg. Co., Columbus, O. B. C. Zuhars is president and general manager.

* * *

Buckeye Iron & Brass Works, Dayton, O., is rebuilding that part of its plant destroyed by fire on June 15. The new building will be 60 x 200 feet, will consist of two bays, one a traveling crane bay 30 x 200 feet, another a standard saw-tooth bay. The building, which is being erected by the Austin Co., Cleveland, will house the iron valve department and the oil mill machinery manufacturing division.

Book Review

Grinding and Polishing of Metals (Das Schleifen und Polieren der Metalle), by Bertold Buxbaum, paper, 68 pages 6¼ x 9 inches, published by Julius Springer, Berlin, Germany, and supplied by THE FOUNDRY, Cleveland, and in Europe by the Penton Publishing Co. Ltd., London.

This book, which is printed in German, is indicated as the third, completely revised edition, but while the title includes polishing as one of the fields covered, the text matter ignores that phase altogether, and relates only to grinding. The book is divided into four chapters of which the first occupying nearly half of the pages is devoted to a discussion of the production and properties of grinding tools or materials. The second chapter is concerned briefly with the treatment or handling of the materials. Chapter III covering 10 pages discusses the selection of grinding wheels. The final chapter relates to machine grinding, and relates to such phases as grinding wheel speed, work feed, depth of cut, traverse speed, finish, grinding rules, cooling, etc.

Tells the Story!

Translated into terms of pounds of metal removed per pound of wheel wear, number of pieces or total tonnage ground per wheel—the fast-cutting action of ABRASIVE COMPANY SNAGGING WHEELS means increased production and lower costs on foundry cleaning operations.

For maximum results on swing frame, floor stand and portable grinders we suggest you investigate the application of Abrasive Company Wheels to your snagging requirements. Details gladly sent on request.

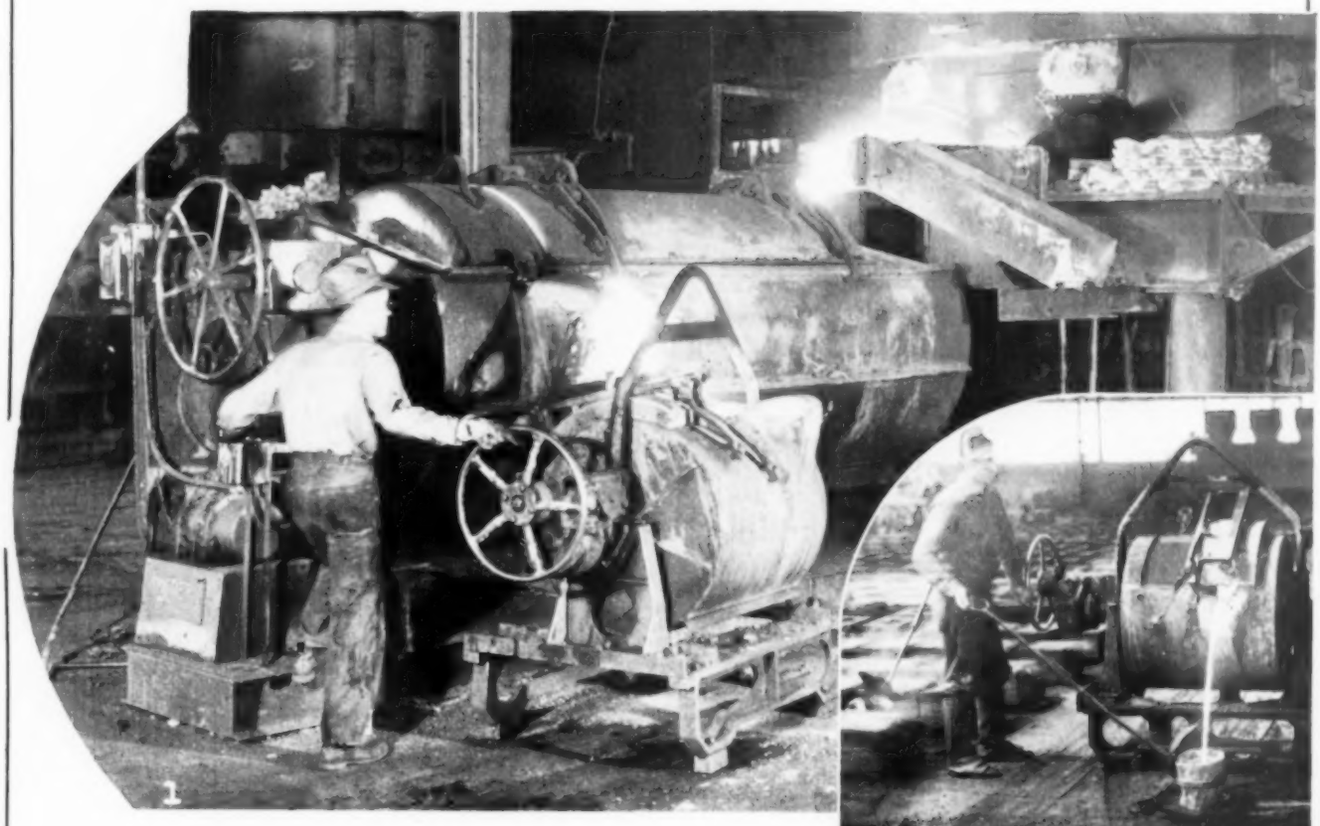
ABRASIVE COMPANY

TRADE ABRASIVE MARK REGISTERED

Tacony and Fraley Sts., Philadelphia, Pa.

DIVISION OF SIMONDS SAW AND STEEL CO.

Eliminate Costly Metal Irregularities



with

Modern Covered and Insulated Mixing and Distributing Ladles!

Hard spots in castings causing the loss of thousands of dollars in scrap castings, and tool set-ups can be largely eliminated by using these ladles. For this purpose the elongated mixer ladles shown above offer the following advantages:

1. Larger quantities of metal can be held for longer periods, insuring a thoro mix.
2. They are covered and insulated so that the temperature loss in the ladle is negligible.
3. Refining with a flux such as Purite is equally practical for light castings and for foundries melting as low as one or two tons per hour.
4. Boiling is limited to one end of the ladle where the iron and flux enter. The metal quiets down, with complete separation of the slag as it travels across to the teapot spout.

Send for the new Modern Catalog giving full details

Patented & Patents Pending

MODERN EQUIPMENT COMPANY

DEPT. 137
PORT WASHINGTON, WIS.

Pouring from Modern Cylindrical Ladles into hand ladles and molds.

MODERN

Covered and Insulated Ladles
Lifetime Geared Ladles
Improved Bottom-Pour Ladles
Metal Pouring Systems
Crane and Monorail Systems for Metal and Mold Handling
Furnace Charging Cranes
Sand Conditioning Systems

MODERN EQUIPMENT CO.

NEW TRADE PUBLICATIONS

Copies of any of the literature listed below may be obtained by writing directly to the companies involved, or by addressing THE FOUNDRY, in care of Readers' Service Department, 1213 West Third Street, Cleveland

ALLOY CAST IRONS—International Nickel Co. Inc., New York, has made available an 8-page reprint of an article, "Implements and Tractors Use Alloy Cast Irons," by Harold L. Geiger. As the title indicates, the article contains information on applications and compositions of alloy cast irons employed.

CAPACITORS — General Electric Co., Schenectady, N. Y., has published an interesting booklet illustrating and describing manufacturing methods in the production of pyranol capacitors. The unit is designed to improve power-factor and reduce kva demands for industrial power purchases.

GAGES—Bristol Co., Waterbury, Conn., has issued several new bulletins on its line of recording and controlling gages. The bulletins are numbered 483, 484, 485 and 486.

MOTORS—Direct current and slip ring motors of from 1 to 350 horsepower are described in two bulletins published by the Century Electric Co., 1806 Pine street, St. Louis.

LANTERN—A descriptive folder recently has been issued by the National Carbide Corp., Lincoln building, New York, on its new inspector's lantern for industrial uses.

COUPLINGS—Falk Corp., Milwaukee, has issued its new bulletin 4100 on its line of flexible couplings. The text treats design, selection, features of construction, dimensions of the various types and numerous installation views.

STACKERS—Folder No. 508 on its line of stackers, tiering machines and portable elevators for piling goods and products from floor to ceiling, recently has been published by Lewis-Shepard Co., 175 Walnut street, Watertown, Mass.

BRAKE LININGS—In a new brochure entitled "Friction Materials for the Iron and Steel Engineer," Johns-Manville, 22 East Fortieth street, New York, presents comprehensive data on brake linings and clutch facings for steel mill equipment.

X-RAY UNIT—Adam Hilger Ltd., London, England, has issued a 9-page bulletin describing its portable industrial X-ray unit. The X-ray tube is constructed of metal and porcelain and employs a multiple target with four faces plated with copper, cobalt, chromium and molybdenum, respectively.

DUST COLLECTORS — Claude B. Schneible Co., 3951 Lawrence avenue, Chicago, has published a folder describing and illustrating its new small type wet dust collector. Information also is given on capacities, dimensions, and approximate weight of the collectors.

CASTINGS—International Nickel Co., New York, has published an 8-page reprint of an article entitled, "Nickel Alloy Steels and Cast Irons in the Pulp and Paper Industry," by A. G. Zima. The paper gives information on compositions, properties and applications of nickel alloy steels and cast irons.

INSTRUMENTS — Leeds & Northrup Co., 4904 Stenton avenue, Philadelphia, has issued a broadside, N-33 on its line of indicating, recording, signal and control instruments. The various models of recorders, controllers and pyrometers are illustrated and described in detail.

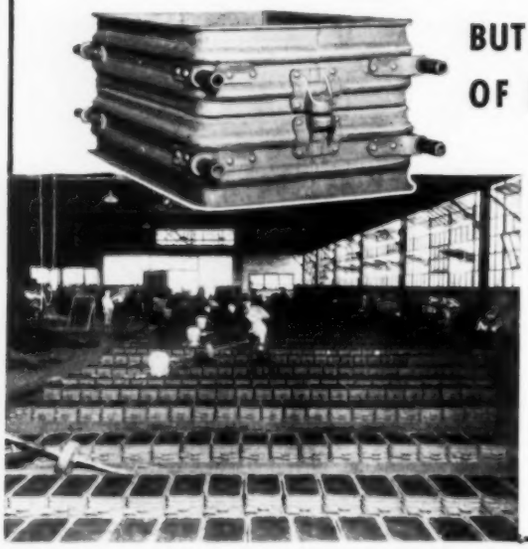
FIRE BRICK—Quigley Co. Inc., 56 West Forty-fifth street, New York, recently has published a bulletin on its line of insulating and super insulating fire brick. The various types and their applications are given. Technical data on temperatures and weights are given and advantages listed.

FURNACES — A rather distinctive folder published by Leeds & Northrup Co., 4904 Stenton avenue, Philadelphia, presents its line of furnaces for heat-treating tools, dies and production parts. All models and sizes are covered and equipment for hardening, tempering, annealing, normalizing and nitriding are illustrated and described.

SALES — Porcelain Enamel institute, 612 North Michigan avenue, Chicago, has published an interesting book "How To Increase Your Sales". Written by an authority on the preparation of sales manuals, the 92 pages in the book are filled with information which, if followed by salesmen, should result in greater sales of any major appliance. Many of

(*Concluded on page* 100)

STRENGTH



BUT NOT AN OUNCE OF EXTRA WEIGHT

Truscon Foundry Flasks are made of heavy gauge, rust-resisting Copper-Bearing Steel. Every Truscon cope, drag and cheek is one integral piece. There are no built-up sections to jar loose.

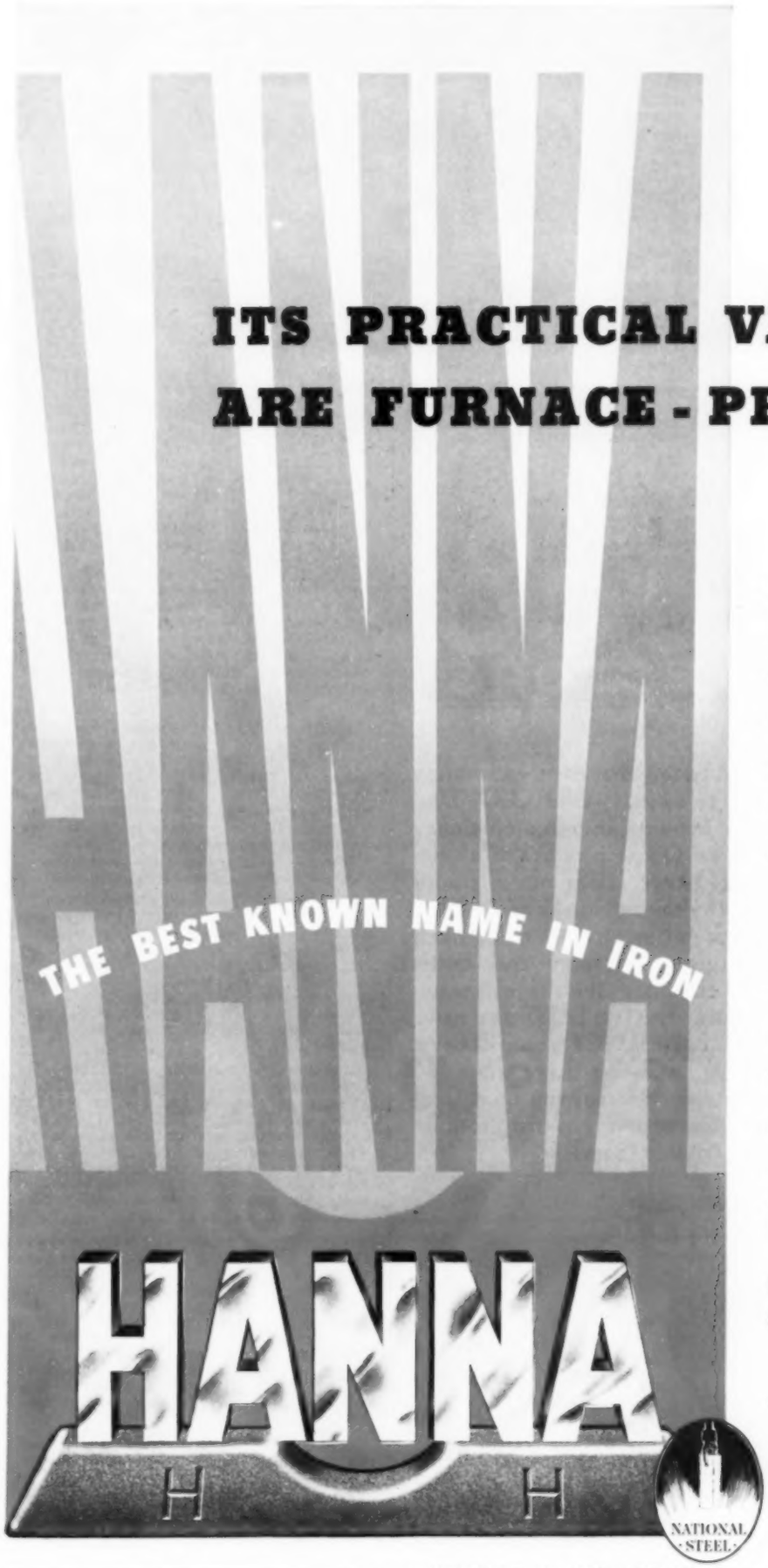
Truscon Copper-Bearing Steel Foundry Flasks are engineered to save YOU money. Strength is secured with ribs and flanges extending full height around the entire flask without buckling or cutting away the metal. Light weight is secured because strength is obtained by *construction* rather than mere bulk.

These and other important advantages of Truscon Copper-Bearing Steel Foundry Flasks merit your investigation because they offer you appreciable savings in handling, maintenance and replacement costs. Write for free bulletin.

TRUSCON STEEL COMPANY • FOUNDRY FLASK DIVISION
6100 TRUSCON AVENUE • CLEVELAND, OHIO

TRUSCON

FOUNDRY FLASKS



ITS PRACTICAL VALUES ARE FURNACE-PROVED

FOR seventy years, Hanna merchant pig iron has represented the utmost in dependability. Produced from choice ores of varied metallurgical qualities, it has proved its practical value for the particular job at hand wherever furnace requirements are severe.

Through constant research, and the accumulated experience of men who have been making quality iron for generations, Hanna continues to keep that vital step ahead of changing furnace practice — to remain, as it has since 1867, the best known name in iron.

BRANDS: Buffalo · Detroit · Susquehanna

GRADES: Foundry · Malleable · Silvery Ferro-Silicon

THE HANNA FURNACE CORPORATION

Buffalo · Detroit · New York
Philadelphia · Boston

MERCHANT PIG IRON DIVISION OF

NATIONAL STEEL CORPORATION

(*Concluded from page 98*)

the examples, of course, are based on porcelain enamel objects, although the book is not strictly concerned with sale of that product.

CONTROL VALVES — Hancock Valve division, Manning, Maxwell & Moore inc., Bridgeport, Conn., recently has issued a well-illustrated folder describing its line of control valves. General applications of the valves are listed and dimensions and list prices are given.

BLASTING EQUIPMENT — Pangborn Corp., Hagerstown, Md., has published a booklet on its special rotoblast machines. Illustrations and text discuss the application of these machines in the cleaning of heavy castings, cleaning of automotive parts, in foundries specializing in church, school and theater seat castings. Illustrations were taken in foundries of the Pontiac Motor Co., Pontiac, Mich., Buick Motor Co., Flint, Mich., Studebaker Corp., South Bend, and American Seating Co., Grand Rapids, Mich.

INSULATION — Johns-Manville, 22 East Fortieth street, New York, has published a new 32-page industrial insulation catalog which contains specific information on sheet, block and pipe insulations. An added feature of the catalog is a section dealing with insulating brick and 10 pages devoted to specific recommendations for the insulation of many types of industrial equipment.

ALLOYS—Vanadium Corp. of America, 420 Lexington avenue, New York, recently has published a 28-page booklet on "Vanadium in Cast Iron." Information presented includes the effect of vanadium on microstructure, tensile strength, hardness, transverse strength, compressive strength, impact resistance, machinability, wear resistance, growth and distortion, and heat treatment. Compositions for various uses are presented and information is given on special purpose irons.

GRINDERS—Bulletin No. 837 illustrating and describing its line of high speed, heavy duty grinders, including a new model with wheel wear compensator, has been issued by Kling Bros. Engineering Works, 1300 North Kostner avenue, Chicago. Safety features and construction advantages are listed and illustrations shown.

CEMENTS—Quigley Co. Inc., 56 West Forty-fifth street, New York, recently has published a bulletin on its acid-proof cements designed for chemical and metallurgical industries where the material must withstand hot or cold, strong or weak liquid acids, and hot or cold acid gases. Photographs show applications of the three types.

FOUNDRY EQUIPMENT—Dodge Mfg. Corp., Mishawaka, Ind., has issued a folder on the modernization of foundries. It contains information on a line of power transmission and belt conveyor equipment for foundries including illustrations and material on bearings, pulleys, sand storage conveyors, idlers and angle frame protected screw take-ups.

SCREENS — Allis-Chalmers Mfg. Co., Milwaukee, has published an attractive folder on its line of foundry screens and shakeouts. The publication treats the portable conditioning units, shakeout screens, low head vibrating screens and miscellaneous foundry equipment. Descriptions, illustrations and specifications are included.

WELDING SAFETY—Preventing welding and cutting fires is the subject discussed in a new booklet recently published by the Linde Air Products Co., New York. The booklet includes rules and recommendations to follow for prevention of the possibility of welding or cutting fires and stresses the importance of being adequately prepared in case of such an emergency.

INHALATORS—Mine Safety Appliances Co., Braddock, Thomas and Meade streets, Pittsburgh, has issued a pamphlet describing its inhalators used for the resuscitation of victims of carbon monoxide, gas, electric shock, drowning, etc. Design and application of the inhalators together with specifications and alternate inhalator assemblies are included.

HOSE—Electric Hose & Rubber Co., Wilmington, Del., has published a new 64-page catalog on its line of braided and molded hose. The data, prepared for the convenience of the user, is indexed according to purpose as well as kinds of hose. Information includes jobbers and resale net prices on hose and couplings and is in loose leaf, pocket size form.

VIBRATION ELIMINATORS—Korfund Co. Inc., Long Island City, N. Y., has published a booklet on its antivibration products and their application to the operating machines so that they are isolated from the buildings in which they are located. The text includes information on steel spring vibro-dampers, and organic material isolators such as natural cork and rubber products. Various installations are described and illustrated.

EXHAUSTERS—Bulletin 55-B10, issued by the Roots-Connersville Blower Corp., Connersville, Ind., covers the application of certain units as exhausters for priming the larger centrifugal pumps and includes, in addition to listings of some sizes, a table of relative volumes of air at different vacuums and a table giving the cubic content of pipe of different diameters for each foot of length. This bulletin also contains numerous installation views.

MAKE YOUR FOUNDRY MORE EFFICIENT with DRACCO DUST COLLECTORS

Get Bulletin No. 302

DUST is an enemy that costs you money in MANY ways. DRACCO Dust Collectors increase foundry efficiency in four ways: (1) protect health of employees; (2) keep DUST out of equipment thereby saving repairs and adding years of useful service to equipment; (3) employees do more and better work; (4) eliminates the risk of annoying law suits. The less DUST you have, the greater EFFICIENCY you will have. DRACCO Engineers have over 20 years experience in solving Dust Control problems of every description. Why not consult them?

DRACCO DUST COLLECTORS are maintained ON THE CLEAN AIR SIDE

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• *Write for Bulletin No. 302* •

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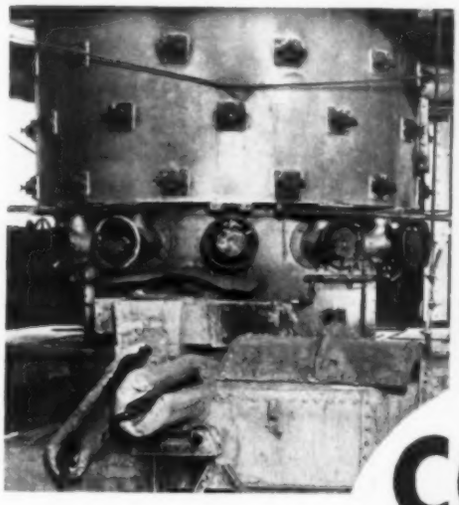
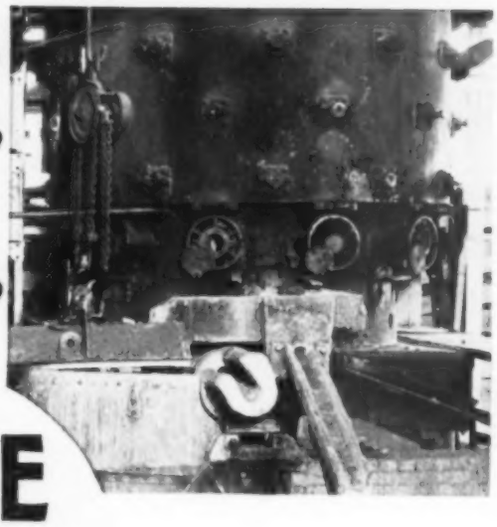
4050 E. 116th St., Cleveland, Ohio • New York Office, 130 W. 42nd St.

PNEUMATIC CONVEYORS • DUST COLLECTORS

Balanced Blast CUPOLA



SAVES 20% *to* 40% *on* COKE



The Balanced Blast Cupola was developed and perfected by the British Cast Iron Research Association and is fully protected by patents.

More than 170 Balanced Blast Cupolas have sharply reduced melting costs—saving foundries from 20% to 40% on coke—in England, U. S. A. and eleven foreign countries.

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10% to 20% increase in melting capacity.

Accurate metallurgical control.

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Reduction in defective castings due to less oxidation, iron melted hot and uniform analysis.

Hot iron at the spout and uniform temperature throughout the heat.

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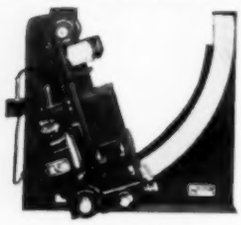

Universal Sand Strength Machine

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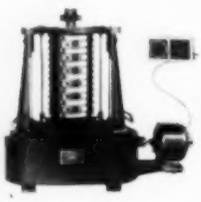

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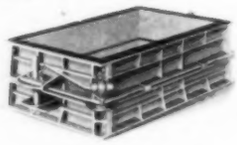

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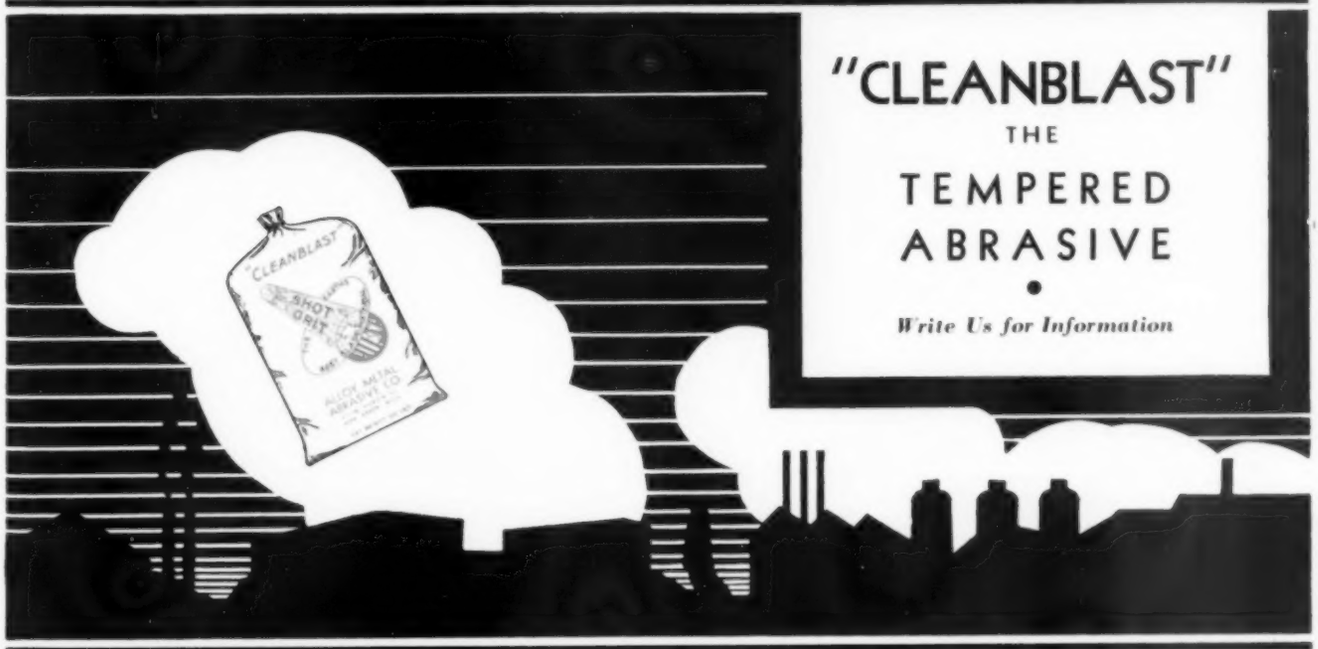

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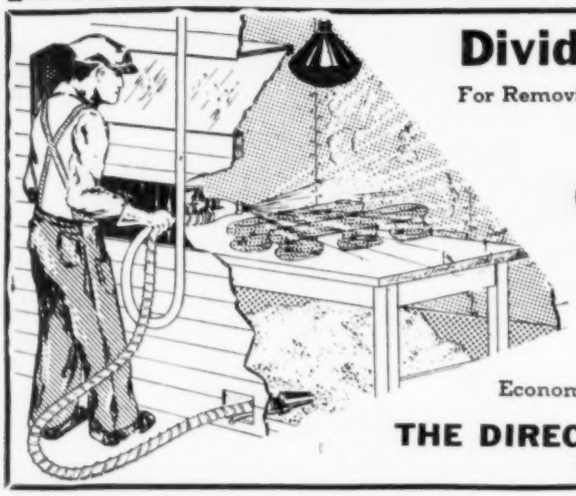

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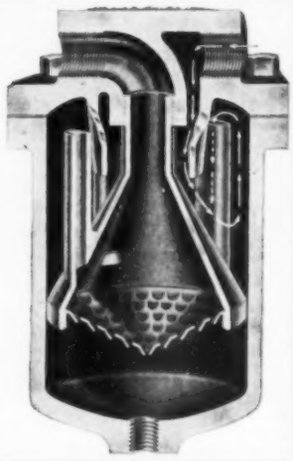

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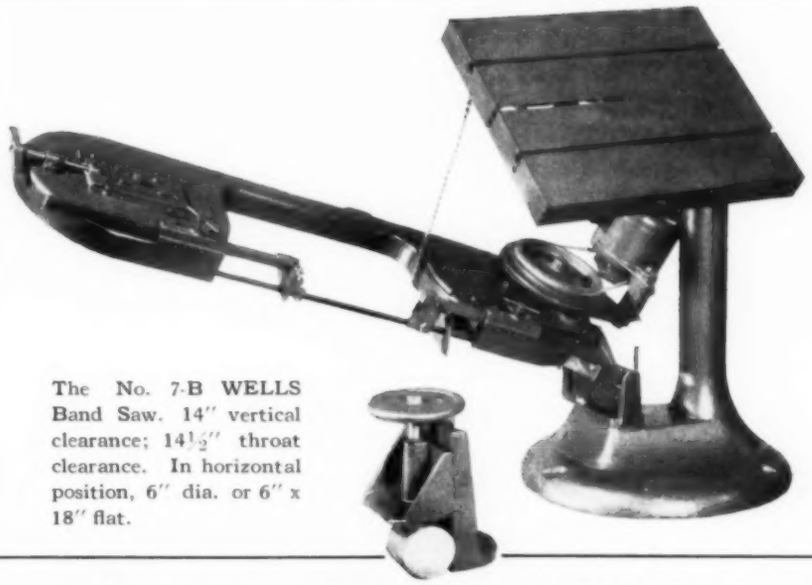

The No. 7-B WELLS Band Saw. 14″ vertical clearance; 14½″ throat clearance. In horizontal position, 6″ dia. or 6″ x 18″ flat.

● *for the foundry*

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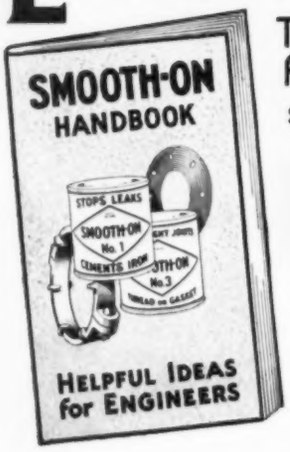

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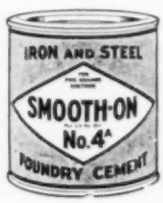

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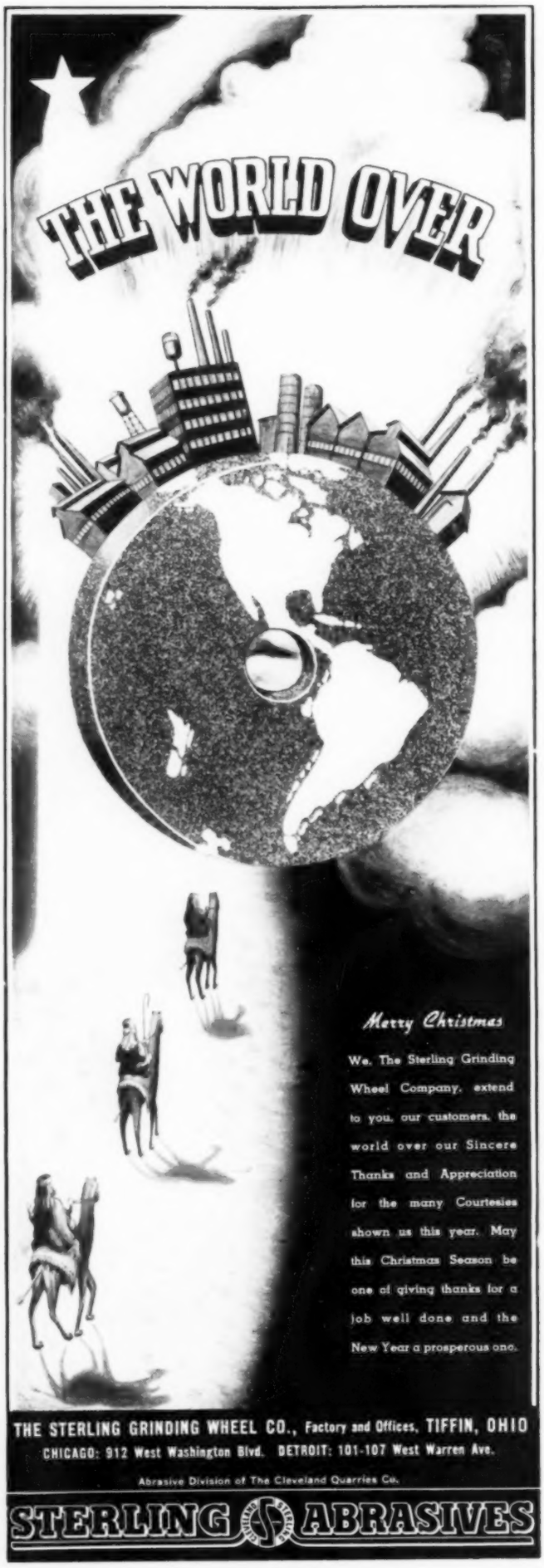
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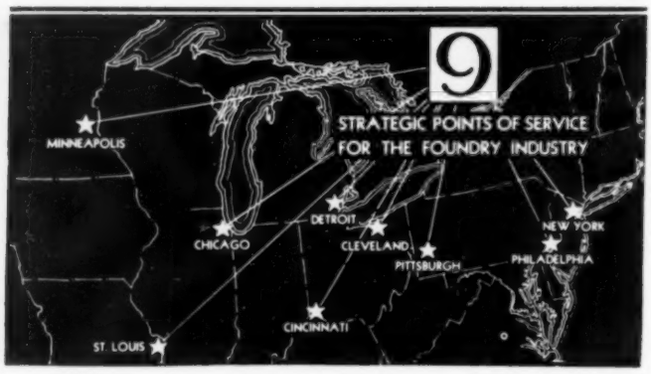

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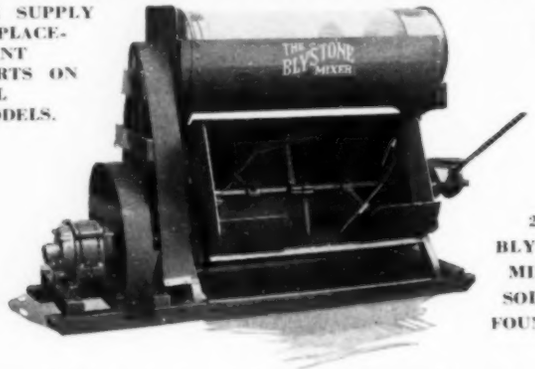

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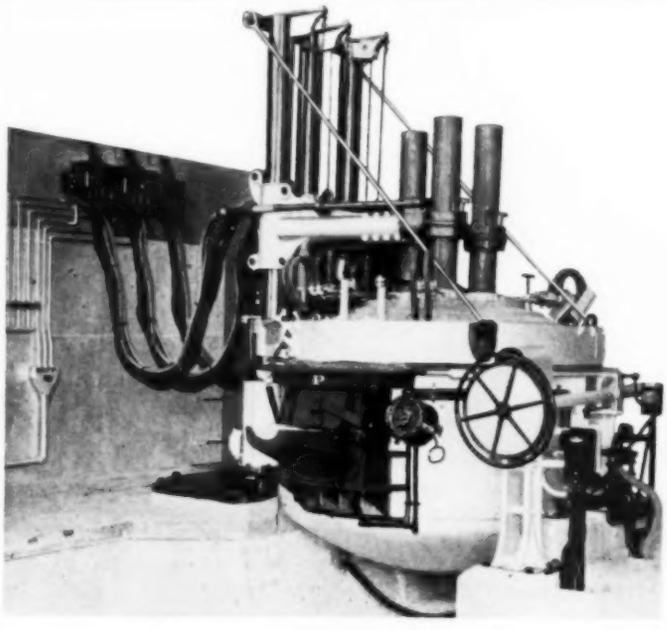

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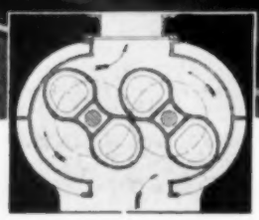

Changing conditions within the cupola naturally set up a constantly varying resistance to the flow of air through the tuyeres. With a Roots Rotary Positive Blower supplying the air, the pressure developed equals the resistance to the flow through the cupola—no wasting of pressure by throttling as with other type blowers which must develop at all times the maximum pressure that might be needed for emergency operation but which may never be needed in actual practice.

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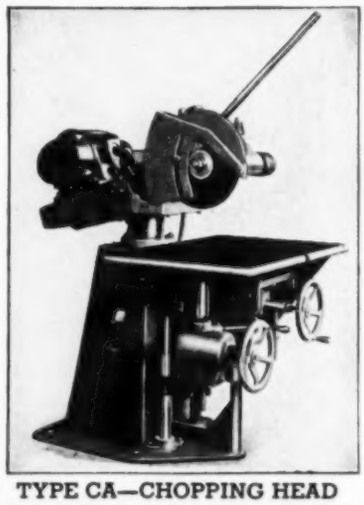
TABOR-BRASIVE CUT-OFF MACHINE



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ITS SPEED AND ADAPTABILITY ENTIRELY REMOVE THE CUTTING PROBLEM

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The TABOR Mfg. Co.

TRADE 1884 MARK

MAKERS OF TABOR MOLDING MACHINES

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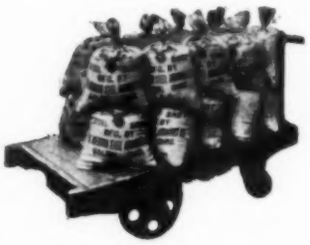
Use American Steel Abrasives

You owe it to your foundry and foundrymen to make 1938 more productive through using American Steel Abrasives in your blast cleaning equipment.



20 bags of American Eversharp Steel Grit or Standardized Steel Shot will do more and better work than a carload of the best sand.

You'd be surprised how American Standardized Steel Shot and American Eversharp Steel Grit cut cleaning costs . . . save you money . . . do a better job . . . and make your plant a happier place to work in by eliminating dust.

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DEPARTMENT F

THE AMERICAN STEEL ABRASIVES COMPANY

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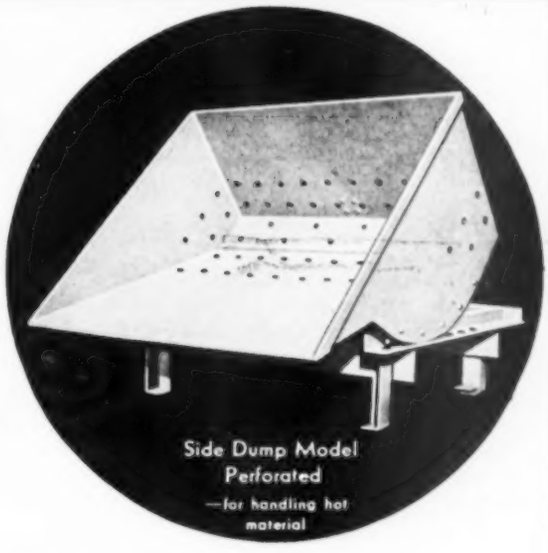
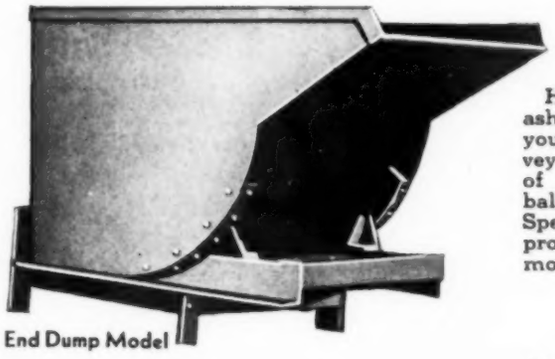
ROURA

Dump Hoppers reduce material handling costs in foundries





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Roura Iron Works

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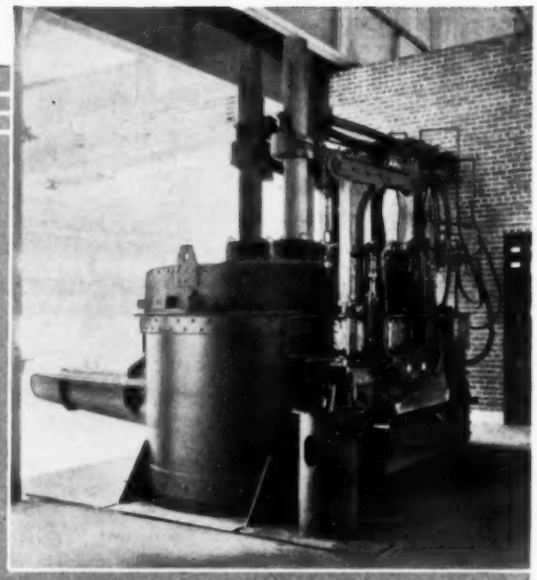
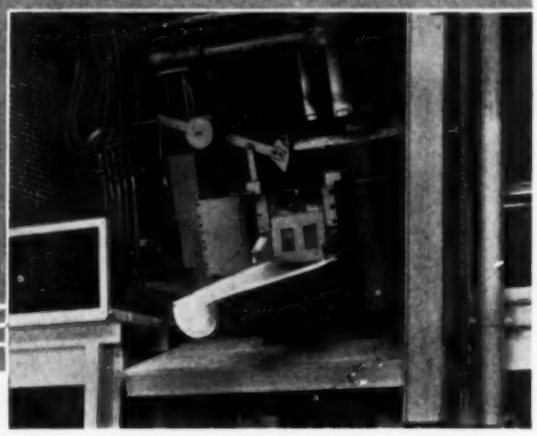


Modern IMPROVEMENTS IN Heroult ELECTRIC FURNACES



TYPE 1½ *Heroult Electric Furnace showing floor tilting, copper tubing, and wedge type electrode holders.*

FOUR major innovations make Heroult Electric Furnaces more efficient than ever —

Floor attached to shell tilts with furnace.

Water-cooled copper tubing, with suitable separation from mast arms, carries current to electrodes to prevent hysteresis and eddy current losses.

Improved wedge type electrode holders.

Lightweight welded roof coolers of corrosion-resisting steel.

Heroult Electric Furnaces have gained a remarkable reputation for efficient melting and refining of all kinds of ferrous materials by basic or acid process—including alloy, tool and forging steels, iron and steel castings. Any capacity from ½ ton to 100 tons; removable roof, chute, machine or hand charging.

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UNITED STATES STEEL

MILWAUKEE THREAD-STEM, SINGLE and DOUBLE HEAD CHAPLETS

The unusual features of this Chaplet, made in both Double Head and Single Head styles, insure fusing in any Casting. Especially important in pressure Castings. Note the many sharp circular Rings that have a larger diameter than the stem itself.

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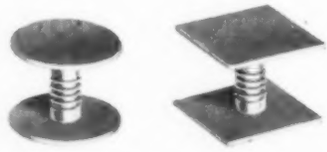
And you pay no more for these than you pay for ordinary Chaplets.



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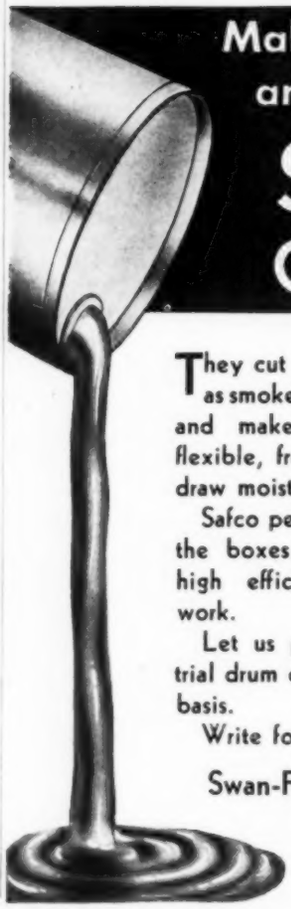
Manufacturers of Foundry Chaplets, Galvanized Riddles, Kordo Core Paste, Tripolex and Non Silica Partings



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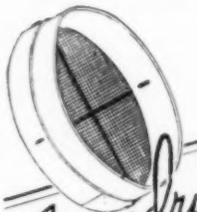

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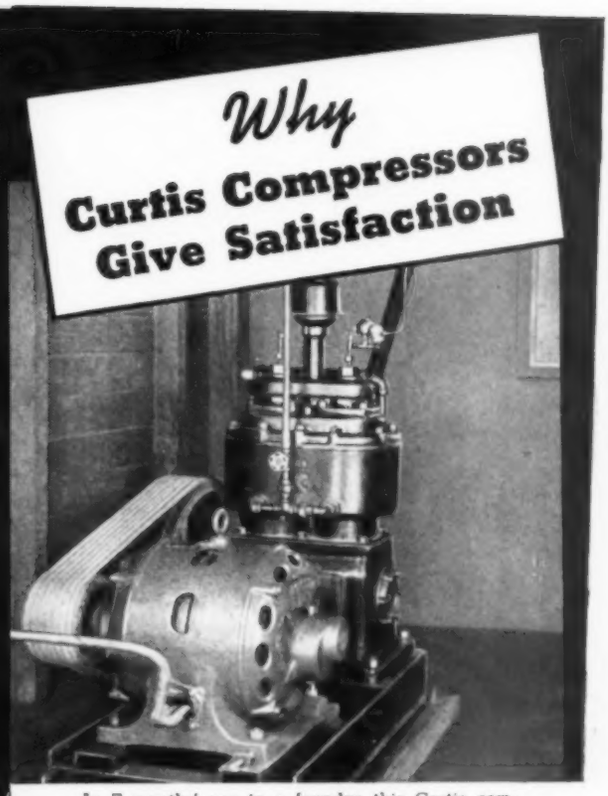

In 7 months' use in a foundry this Curtis compressor unit hasn't been touched except for oiling.

Actual performance records supply the most convincing facts. In selecting an air compressor, not only efficiency, but low maintenance cost and faithful carefree performance should be given equal consideration.

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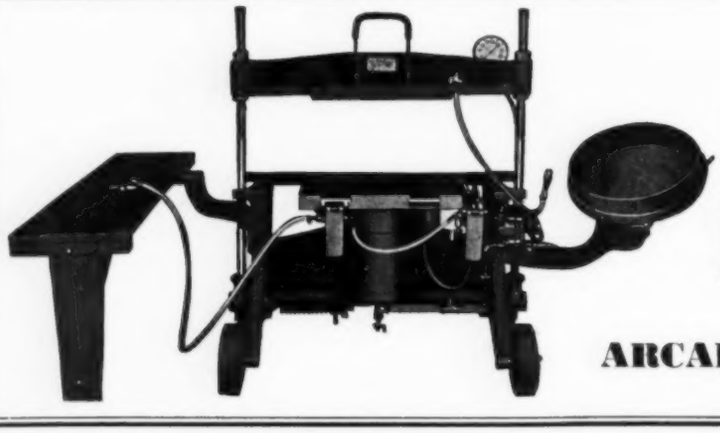

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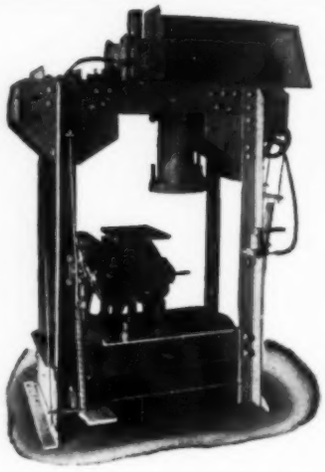

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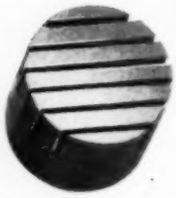

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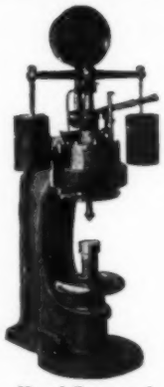

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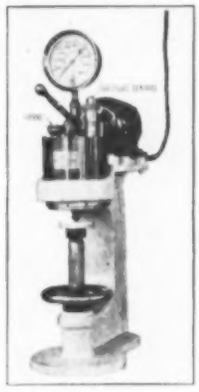

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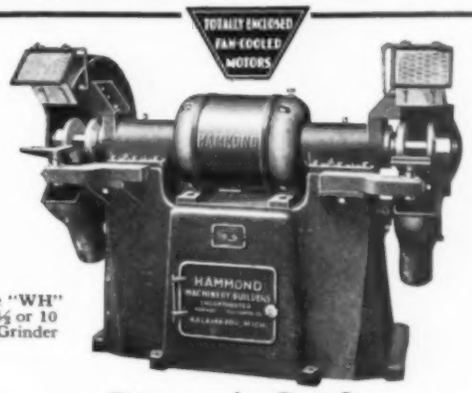

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Grinders up to 25 H.P.—both SINGLE and VARIABLE SPEED and for VITRIFIED or HIGH-SPEED wheels.

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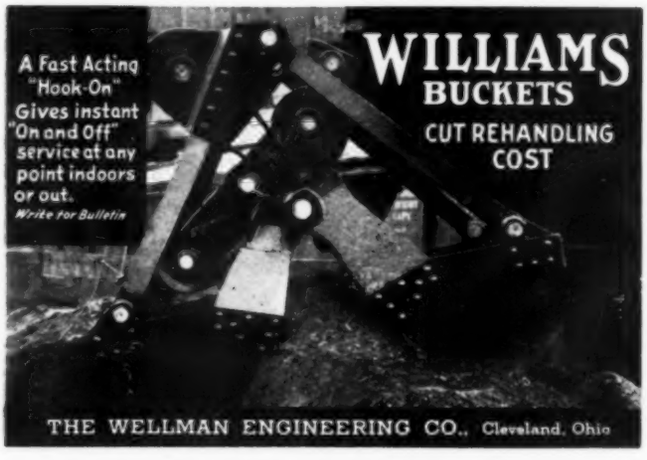
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who knows how to handle men and take full charge in electric steel miscellaneous jobbing foundry on the Pacific Coast. Must be a go-getter and wide-awake. State age, experience and references. Address Box 246, THE FOUNDRY, Cleveland.

WANTED—BRASS FOUNDRY FOREMAN

for a production foundry. Must have complete knowledge of melting, coremaking, and molding. One who can handle men. Give complete past experience, age, and salary expected. Address Box 250, THE FOUNDRY, Cleveland.

EXPERIENCED WORKING-FOREMAN

to take charge of brass and aluminum, jobbing and production foundry. Give age, experience, references and salary expected. Good position for the right man. Address Box 252, THE FOUNDRY, Cleveland.

SALESMEN

Have a fine proposition for salesmen familiar with foundry experience. Calling on all foundries. Can be handled as a straight or side line. Liberal commission. Address Box 240, THE FOUNDRY, Cleveland.

WANTED
ELECTRIC FURNACE MELTER

A capable, experienced operator in both carbon and high alloy steels to take complete charge of electric furnaces in a miscellaneous steel casting jobbing foundry on the Pacific Coast. State age, experience and references. Address Box 247, THE FOUNDRY, Cleveland.

Help Wanted

BRASS FOUNDRY FOREMAN

wanted with practical and technical experience in production. Address Box 248, THE FOUNDRY, Cleveland.

WANTED—FOUNDRY MANAGER

Prominent machinery manufacturing establishment in Switzerland has position open for well experienced man, capable of managing its foundry departments (hand and machine-forming—metal castings). Perfect knowledge of German language indispensable. State experience, references and salary expected. Photo desired. Address Box 245, THE FOUNDRY, Cleveland.

SUPERINTENDENT WANTED
FOR NONFERROUS FOUNDRY

which casts many modern alloys. Knowledge of gating metal patterns and their adaptation to molding machines, is necessary. Tonnage 60% aluminum castings this year. Address Box 254, THE FOUNDRY, Cleveland.

NATIONALLY KNOWN CORE OIL MANUFACTURER has opening in Eastern States for a high-grade core oil salesman. Only those with proven successful record selling core oils will be considered. Applications will be confidential and must state age, experience and salary expected. Address Box 242, THE FOUNDRY, Cleveland.

Employment Service

ATTENTION FOUNDRY OWNERS

Write or wire us for technically-trained practical foundry foremen, superintendents, production managers, chemists, metallurgists, core foremen, cost clerks, salesmen, patternmakers, melters (electric, open-hearth, converter and cupola). No charge. **McLAIN'S SYSTEM, INC., 804 Goldsmith Bldg., Milwaukee, Wis.**

SALARIED POSITIONS
$2,500 to $25,000

This thoroughly organized advertising service of 28 years recognized standing and reputation carries on preliminary negotiations for positions of the caliber indicated, through a procedure individualized to each clients personal requirements. Several weeks are required to negotiate and each individual must finance the moderate cost of his own campaign. Retaining fee protected by a refund provision as stipulated in our agreement. Identity is covered, and, if employed, present position protected. If you have actually earned over $2,500, send only name and address for details.

R. W. BIXBY, INC.
101 Delward Bldg., Buffalo, N. Y.

CLASSIFIED RATES

Position Wanted advertisements: minimum ad 30 words, $1.50, additional words 5c each.

Help Wanted advertisements: minimum ad. 50 words $3.00; additional words 6c each.

For Sale, Wanted and Miscellaneous advertisements, 10c per word, minimum advertisement $3.00.

Reduced rates for three or more insertions.

First line is set in bold face type. A box address counts as six words.

Positions Wanted

GENERAL MANAGER — SALES EXECUTIVE

Experienced in building up and maintaining foundry business. Knows costs, sales, finance, production and profit producing methods. Excellent past record and A-1 reference. Salary open. Address Box 253, THE FOUNDRY, Cleveland.

GRAY IRON SUPERINTENDENT

Foundry executive 15 years. Practical experience, coremaking, molding, cupola practice and patternmaking; expert rigger for high production at minimum cost. Efficient and up-to-the-minute in all modern methods of foundry practice. Ability to handle all classes of help successfully. Address Box 168, THE FOUNDRY, Cleveland.

SUPERINTENDENT

Capable and practical foundry executive, heavy, medium and light general jobbing and matchplates; gray iron, semi-steel; all alloys and nonferrous; green and dry sand. McLain's system cupola practice. Good estimator. Address Box 222, THE FOUNDRY, Cleveland.

BRASS FOUNDRY FOREMAN

wants position. Twenty-five years practical experience in brass, bronze, and aluminum. Jobbing and production. Willing to start as working foreman. Address Box 219, THE FOUNDRY, Cleveland.

EXPERT — GRAY IRON AND SEMI-STEEL Experienced all types castings. Can mix, melt by analysis, estimate from blueprints. Technically trained. McLain graduate. Immediately available. A-1 references. Address Box 186, THE FOUNDRY, Cleveland.

BRASS FOUNDRYMAN

Experienced all branches of trade; metals and mixes. Willing to take full charge of brass foundry, heavy and light work. Ambitious worker. Address Box 205, THE FOUNDRY, Cleveland.

PRACTICAL MAN, EXECUTIVE AND PROduction experience, including cleaning, annealing and galvanizing, also wage incentive experience. Address Box 257, THE FOUNDRY, Cleveland.

GRAY IRON FOUNDRY SUPERINTENDENT

Practical foundryman, 20 years foundry superintendent. Can thoroughly handle production, estimating and foundry metallurgy on light, medium and heavy castings up to 100 tons each. Successful reputation for meeting rigid metallurgical specifications and sound castings at minimum costs. Record will stand any investigation. Address Box 202, THE FOUNDRY, Cleveland.

FOUNDRY MANAGER
OR SUPERINTENDENT

PRACTICAL AND TECHNICALLY TRAINED. PRODUCING HIGH-TEST AND ALLOY IRON. SPECIAL ANALYSIS FOR ANY REQUIREMENT. NI-RESIST, NI-HARD, NONFERROUS METALS, MARINE, JOBBING, HEAT-RESIST, MACHINE TOOL, GAS, AND DIESEL ENGINE CASTINGS, LARGE AND SMALL. OVER 25 YEARS PRODUCTION EXPERIENCE. LARGE TONNAGE PREFERRED. CLEAN, SUCCESSFUL RECORD. ADDRESS BOX 183, THE FOUNDRY, CLEVELAND.

ELECTRIC STEEL MELTER

Fully experienced in production of steel and alloys, capable of taking complete charge of melting and labor. Thirty years of age. Married. Address Box 217, THE FOUNDRY, Cleveland.

Classified Ads

Positions Wanted

WANTED

Position by technical and practical molder as assistant in large foundry or foreman in medium size shop. Canada or the States. Mix and melt by analysis. Address Box 103, THE FOUNDRY, Cleveland.

ALUMINUM PERMANENT MOLD ENGINEER

Fifteen years experience on mold design and equipment for permanent mold foundry, wants position as sales engineer. Address Box 232, THE FOUNDRY, Cleveland.

SUPERINTENDENT OR FOREMAN

Grey iron, semi-steel. Twenty-nine years practical and technical experience, 19 executive. All classes of work, light and heavy jobbing, and production; some nonferrous. McLain graduate. Up-to-date on cupola and alloyed irons. Sober, good rigger and handler of men. References. Address Box 204, THE FOUNDRY, Cleveland.

PRACTICAL AND TECHNICAL GRAY IRON foundryman and patternmaker. Production and cost experience. Available after January 1st, 1938. Address Box 251, THE FOUNDRY, Cleveland.

SUPERINTENDENT OR MANAGER

Desires to connect with medium size job or production shop; now employed. Middle aged foundryman with good habits. Married. References. Address Box 206, THE FOUNDRY, Cleveland.

YOUNG TECHNICALLY TRAINED AND PRACTICAL FOUNDRY EXECUTIVE

with 18 years experience as manager and superintendent of gray iron foundries and machine shops. Experienced in the latest production methods, costs, wage incentives, plant layouts, new development work, sales and customer contact. Loyal, progressive, ambitious, money-saving executive. Address H. W. KELLY, 3827 NORTH SEELEY AVENUE, CHICAGO, ILL.

WANTED

Position by practical and technical foundryman, as general foreman or sup't., proven formulas, covering castings, from a few pounds to fifty tons. Estimator, selling experience. Under 45. Open at present. Address Box 104, THE FOUNDRY, Cleveland.

GRAY IRON SUPERINTENDENT

Foundry executive. Twenty-two years practical experience coremaking, molding, cupola practice. Good rigger for high production at minimum cost. Efficient in all modern methods of foundry practice. Ability handle all classes of help successfully. Address Box 180, THE FOUNDRY, Cleveland.

SUPERINTENDENT

Bronze, brass, bearing and aluminum alloys. Thirty years practical experience. Ten last years in executive capacity. Mix metals by analysis, have specialized on U. S. Government formulas by service. French sand, green sand and skin dried molds. Estimate and control core, metal and molding production costs. Desire to better my position. Address Box 194, THE FOUNDRY, Cleveland.

STEEL FOUNDRYMAN

With wide experience in operating foundries along modern and efficient lines, highly trained in pattern layout and equipping for machines and production. Well versed in proper methods of heading and gating castings, also thoroughly experienced in sand mixtures. Address Box 255, THE FOUNDRY, Cleveland.

CORE ROOM FOREMAN

with years of valuable experience to take complete charge of gray iron, brass or aluminum shop, jobbing or production. Address Box 256, THE FOUNDRY, Cleveland.

Opportunities

FOUNDRY OPPORTUNITY

We desire to turn over to a well qualified foundryman a completely equipped gray iron foundry with capacity of 30 tons daily. We will furnish plant, equipment, raw material and at least a large share of working capital and furnish a large volume of work to the right man. Very low overhead and modern equipment. 100 miles from Chicago. Reply by letter and principal will arrange interview in any city. Address Box 239, THE FOUNDRY, Cleveland.

Wanted-To-Buy

MIXERS WANTED

Used Simpson Intensive Sand Mixers. State size, condition and lowest cash price for immediate acceptance. Address Box 578, THE FOUNDRY, Cleveland.

WANTED
DIRECT ARC ELECTRIC FURNACE

Good used 500 pound electric melting furnace for steel. Address Box 244, THE FOUNDRY, Cleveland.

WANTED-TO-BUY

42" x 72" x 1¼" Sly tumbling mill. Address Box 229, THE FOUNDRY, Cleveland.

Foundries For Sale

FOR SALE—IRON FOUNDRY

Completely equipped, located north-central Kansas. Doing good business, making castings from 1 to 300 pounds. Has fully equipped machine shop and pattern shop. Carries large stock for immediate shipment. No labor troubles, raw materials and molding sands close by. Making good money now. Good reasons to sell. Address Box 210, THE FOUNDRY, Cleveland.

For Sale

FOR SALE — ELECTRIC FURNACES

FACTORY REBUILT DETROIT ROCKING ELECTRIC FURNACES. Reconditioned and Modernized. Fully Guaranteed as to Mechanical Condition. Several used furnaces are available in various capacities and ratings. **Please state Voltage and Frequency of Available Power Supply;** also type of metals to be melted and amount required per hour or furnace size desired. Address Inquiries to: **DETROIT ELECTRIC FURNACE CO., 825 West Elizabeth Street, Detroit, Michigan.**

FOR SALE

TWO FOUNDRY COKE HEATERS. Heavy cast iron sectional heaters 20" wide, 36" long, 4 and 5 sections high with grates, $15.00 each.

Address Box 293, Wapakoneta, Ohio.

For Sale

BIGGER BARGAINS THAN EVER

Furnaces, Cupolas, Blowers, Exhausters, Compressors, Mold Machines, Tumblers, Hoists, Core Machines, Mixers, Motors, Power Equipment, etc. Hundreds in stock. 20 years fair dealing with the foundries. Tell us your needs for better production and money savers.

CLIFTON MACHINERY CO.
1023 W. 6th ST.
CINCINNATI, OHIO

FOR SALE

Booth electric brass furnace, type 5R, serial 320, complete with transformer. Will sacrifice. HIGHWAY TRAILER COMPANY, EDGERTON, WISCONSIN.

FOR SALE

Five practically brand new Tabor Stationary Jolt Squeezer Molding Machines. Squeeze cylinder diameter 10" distance between uprights, 32" complete with vibrators, pressure gauges, and blow valves. **INDEPENDENT LOCK CO., FITCHBURG, MASS.**

"GOOD USED FOUNDRY EQUIPMENT"

No. 14—(58" dia.) Paxson Cupola ($375).
No. 5 Roots Blower, 220-V.A.C. motor.
675-CFM, Spencer Blower 7½-HP. 220-VAC.
(5)—10" Tabor Jolt Squeezers.
(5)—18"-30" Tabor Hand Ram Air Rollovers.
7' x 7'6" x 11' Pangborn Room and Table.
(Rebuilt)—72" A.A. American Sand Cutter.
(4)—36" x 60", 60" x 72" Tumbling Mills.
(1)—1¾" Tessmer Sprue Cutter.
176'-250'-350'-714'-1250'-1578' Air Compressors belt and motor drive.
(2)—9-cu. ft. Standard Sand Mixers.
One to five ton Electric Monorail Hoists.
Overhead Electric Cranes 3 to 50 tons, 32' to 130' span.

T. B. MACCABE COMPANY
Beury Bldg., Broad & Airdre Sts., Phila., Pa.

MOLDING MACHINES

1 No. 49 Davenport jolt roll-over draw 50 x 72"—18" draw, 4500 lbs. cap. @ 80 lbs. press.
1 No. 403-W Osborn jolt roll-over pattern draw, 52 x 36"—12" draw, 1300 lbs. cap. @ 80 lbs. press. with swing-out Mold Table.
1 International Type "F" 30 x 12" draw comb. jar ramming power turn-over power draw, 1800 lbs. capacity @ 80 lbs. pressure.
2 International Type "F" (enclosed cyl. type) 27 x 12" draw, 1400 lbs. cap. @ 80 lbs. pressure.
1 International Type "G" heavy duty type, comb. jar ramming, power turn-over and foot draw 1000 lbs. capacity @ 80 lbs. pressure.
2 No. 331 Osborn jolt roll-over squeeze, pattern draw, 6" jolt cyl. 13" squeeze cyl. flask cap 36 x 26", 750 lbs. cap. @ 80 lbs. pressure.

SANDCUTTERS

1 American Model "AA" size 72, 62" cutting cyl. 68" between tractor wheels, equipped with 10 HP 3-60-220V AC Motor.
1 American Model "HP" size 56, 48" cutting cyl. 56" between tractor wheels, equipped with 2-3-60-220V AC Motors.

MISCELLANEOUS

1 each No. "O" 3 ft. dia., No. "2" 6 ft. dia. Simpson Core Sand Mixers, pulley drive.
1 Standard Eqpt. Co. 36 x 44" self-contained Sandblast Barrel with Speed Reducer.
1 Busch heavy duty type Sprue Cutter for Steel 8" throat, cap. 1¾ sq. 2½" rds.
1 Buckeye positive non-crucible open flame Furnace, tilting type, cap. 400-500 lbs. per heat, with oil burner.
1 2-ton Northern Engr. Type "D" Hoist with trolley, with 2 HP 220V AC Motor, 12 ft. lift, speed 10 FPM, floor operated.
1 Roots high pressure Blower No. 10½ net cap. 6500 CFPM @ 7½ lbs. pressure.

Our LIST No. 65 Contains COMPLETE STOCK of FOUNDRY EQUIPMENT BARGAINS AVAILABLE

SCULLY-JONES & COMPANY
19th & Rockwell Sts. Chicago, Ill.

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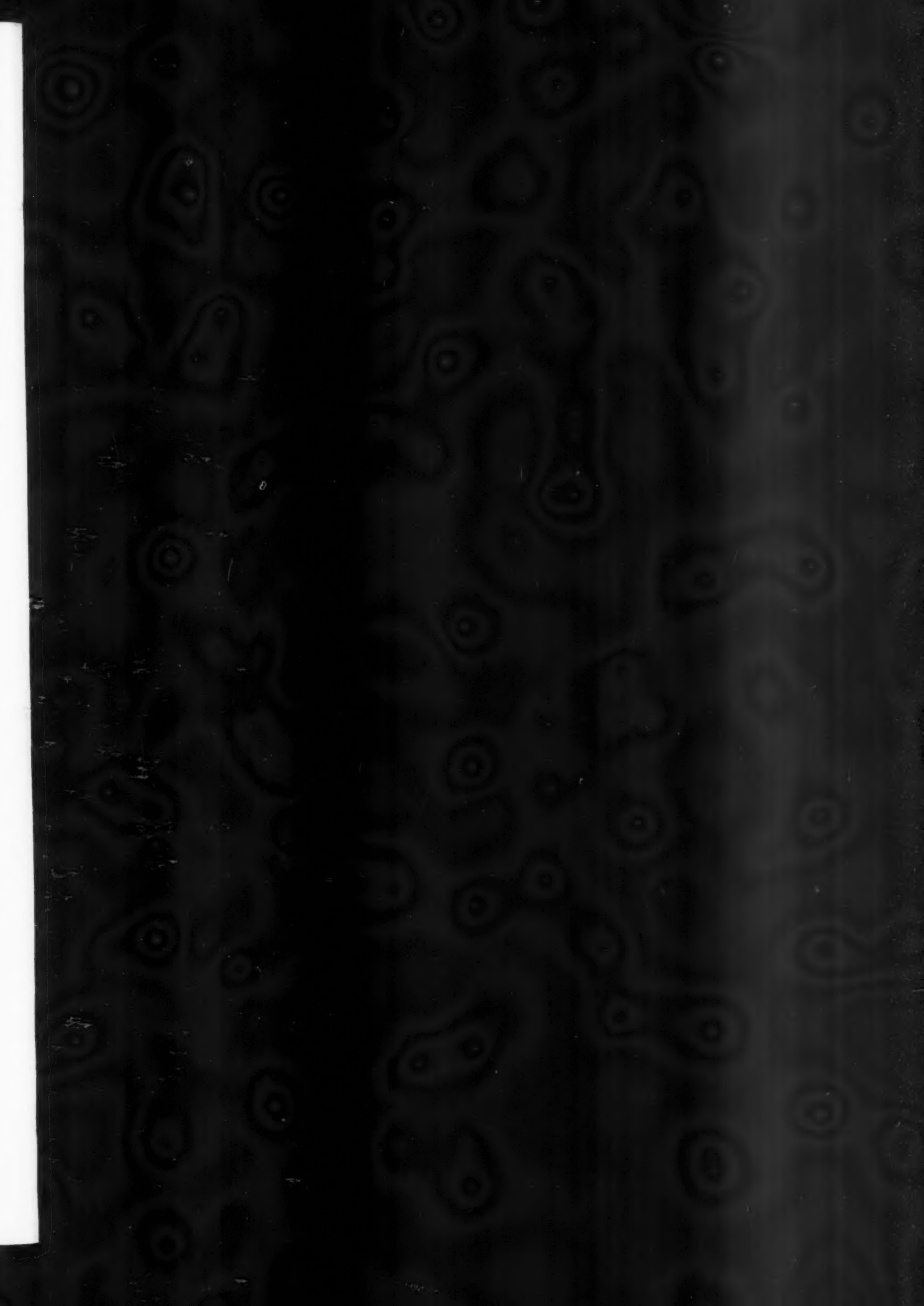
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